File Number **1060**

RCA3773, MJ15003, RCA8638C, RCA8638D, RCA8638E

Silicon N-P-N Epitaxial-Base High Power Transistors

Rugged Devices, Broadly Applicable For Industrial and Commerical Use

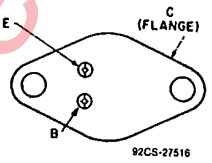
Features:

- *High-dissipation capability*
- *Low saturation voltages*
- *Maximum safe-area-of-operation curves*
- f_T = 2 MHz
- *High gain at high current*

Applications:

- *Series and shunt regulators*
- *High-fidelity amplifiers*
- *Power-switching circuits*
- *Solenoid drivers*

TERMINAL DESIGNATIONS



JEDEC TO-204AA

The RCA3773, MJ15003, RCA8638C, RCA8638D, and RCA8638E are ballasted epitaxial-base silicon n-p-n transistors featuring high gain at high current. They may be used as complements to the p-n-p types 2N6609, MJ15004, RCA9116C, RCA9116D, and RCA9116E, respectively.

They differ in voltage ratings and in the currents at which the parameters are controlled. All are supplied in the steel JEDEC TO-204AA packages.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	RCA3773	MJ15003	RCA8638C	RCA8638D	RCA8638E	
V_{CBO}	160	140	140	120	100	V
V_{CEX}(sus)						
V_{BE} = -1.5 V; R_{BE} = 100 Ω	160	—	—	—	—	V
V_{CER}(sus)						
R_{BE} = 100 Ω	150	150	150	130	110	V
V_{CEO}(sus)	140	140	140	120	100	V
V_{EBO}	7	5				V
I_C	20					A
I_B	5					A
P_T						
At $T_C \leq 25°C$	150	250	200	200	200	W
At $T_C > 25°C$ Derate Linearly	0.857	1.43	1.14			W/°C
T_{stg}, T_J	-65 to +200					°C
T_L						
At distance ≥ 1/32 in. (0.8 mm) from seating plane for 10 s max.	230					°C

RCA3773, MJ15003, RCA8638C, RCA8638D, RCA8638E

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

CHARACTERISTIC	TEST CONDITIONS			LIMITS				UNITS
	VOLTAGE V dc		CURRENT A dc	RCA3773		MJ15003		
	V_{CE}	V_{BE}	I_C	Min.	Max.	Min.	Max.	
I_{CBO}	160[a] 140[a]			– –	4 2	– –	– 1	mA
I_{CEX}	140	−1.5		–	1	–	0.1	
I_{CEX} T_C = 150°C	140	−1.5		–	5	–	2	
I_{CEO} I_B = 0	140 120			– –	– 1	– –	0.25 –	
I_{EBO}	– –	7 5		– –	1 –	– –	– 0.1	
h_{FE}	4 4 2 2		8[c] 16[c] 5[c] 10[c]	15 5 – –	60 – – –	– – 25 10	– – 150 –	
$V_{CEX(sus)}$[b] R_{BE} = 100Ω		−1.5	0.2	160	–	–	–	V
$V_{CER(sus)}$[b] $R_{BE} \leq$ 100Ω			0.2	150	–	150	–	
$V_{CEO(sus)}$[b]			0.2	140	–	140	–	
V_{EBO} I_E = 1 mA			0	7	–	5[d]	–	
V_{BE}	4 2		8[c] 5[c]	– –	2.2 –	– –	– 2	
$V_{CE(sat)}$ I_B = 3.2A = 0.8A = 0.5A			16[c] 8[c] 5[c]	– – –	4 1.4 –	– – –	– – 1	
$I_{S/b}$ t_p = 1 s nonrep.	100 50			1.5 –	– –	1 5	– –	A
$\|h_{fe}\|$ f = 0.5 MHz	10		0.5	4	–	4	–	
f_T				2	–	2	–	MHz
h_{fe} f = 1 kHz	4		1	40	–	–	–	
C_{ob} f = 0.1 MHz	10[a]			–	500	–	500	pF
$R_{\theta JC}$	10		10	–	1.17	–	0.7	°C/W

See page 3 for footnotes.

RCA3773, MJ15003, RCA8638C, RCA8638D, RCA8638E

ELECTRICAL CHARACTERISTICS, *at Case Temperature (T_C) = 25°C Unless Otherwise Specified (Cont'd)*

CHARACTERISTIC	TEST CONDITIONS			LIMITS						UNITS
	VOLTAGE V dc		CURRENT A dc	RCA8638C		RCA8638D		RCA8638E		
	V_{CE}	V_{BE}	I_C	Min.	Max.	Min.	Max.	Min.	Max.	
I_{CBO}	140[a]			–	1	–	–	–	–	mA
	120[a]			–	–	–	1	–	–	
	100[a]			–	–	–	–	–	1	
I_{CEX}	140	1.5		–	1	–	–	–	–	
	120	1.5		–	–	–	1	–	–	
I_{CEX} T_C = 150°C	140	1.5		–	5	–	–	–	–	
	120	1.5		–	–	–	5	–	–	
I_{CEO} I_B = 0	70			–	1	–	–	–	–	
	60			–	–	–	1	–	–	
I_{EBO}	–	5		–	1	–	1	–	1	
h_{FE}	2		5[c]	25	150	25	150	–	–	
	2		7.5[c]	–	–	–	–	10	100	
	2		10[c]	10	–	10	–	–	–	
$V_{CER(sus)}$[b] $R_{BE} \leq 100\Omega$			0.2	150	–	130	–	110	–	V
$V_{CEO(sus)}$[b]			0.2	140	–	120	–	100	–	
V_{EBO} I_E = 1 mA			0	5	–	5	–	5	–	
V_{BE}	2		7.5[c]	–	–	–	–	–	3	
	2		5[c]	–	2	–	2	–	–	
$V_{CE(sat)}$ I_B = 0.75A			7.5[c]	–	–	–	–	–	1.5	
= 0.5A			5[c]	–	1	–	1	–	–	
$I_{S/b}$ t_p = 1 s nonrep.	35			5.71	–	5.71	–	–	–	A
	25			–	–	–	–	8	–	
$\lvert h_{fe} \rvert$ f = 0.5 MHz	10		0.5	4	–	4	–	4	–	
f_T				2	–	2	–	2	–	MHz
C_{ob} f = 0.1 MHz	10[a]			–	500	–	500	–	500	pF
$R_{\theta JC}$	10		10	–	0.875	–	0.875	–	0.875	°C/W

[a] V_{CB} [b] **CAUTION:** Sustaining voltages $V_{CEX(sus)}$, $V_{CER(sus)}$, and $V_{CEO(sus)}$ *MUST NOT* be measured on a curve tracer. See Figs. 8 and 9. [c] Pulsed; pulse duration = 300 μs, duty factor = 1.8%. [d] Measured at I_E = –0.1 mA.

RCA3773, MJ15003, RCA8638C, RCA8638D, RCA8638E

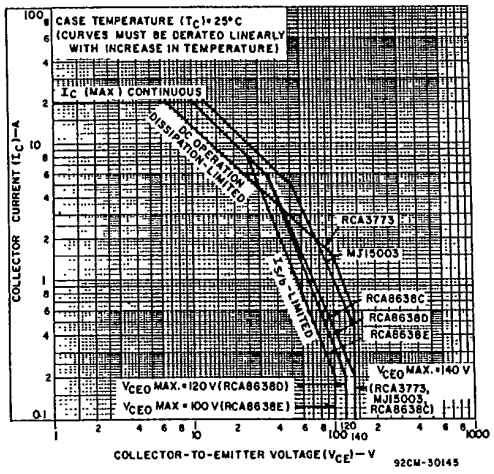


Fig. 1 - Maximum operating areas for all types.

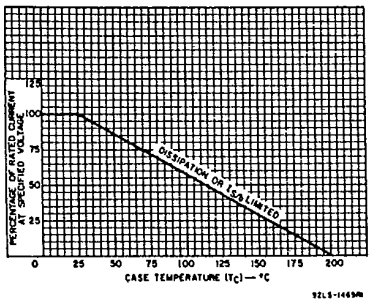


Fig. 2 - Current derating curve for all types.

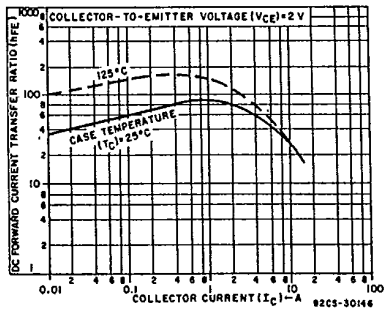


Fig. 3 - Typical dc beta characteristics as a function of collector current for all types.

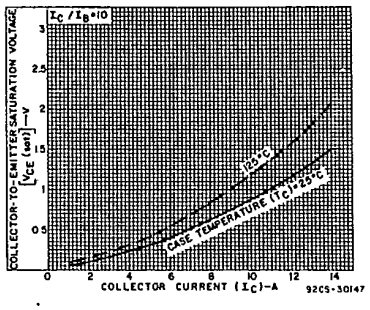


Fig. 4 - Typical saturation voltage characteristics for all types.

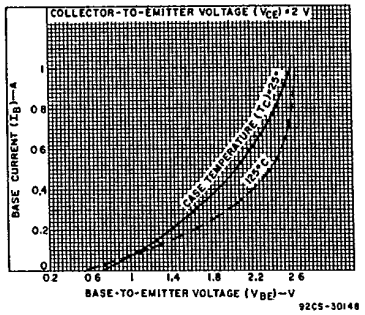


Fig. 5 - Typical input characteristics for all types.

RCA3773, MJ15003, RCA8638C, RCA8638D, RCA8638E

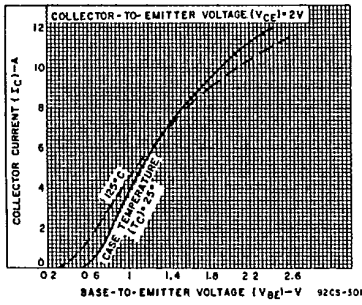


Fig. 6 - Typical transfer characteristics for all types.

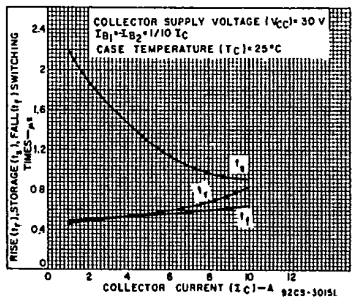


Fig. 7 - Typical saturated-switching times for all types.

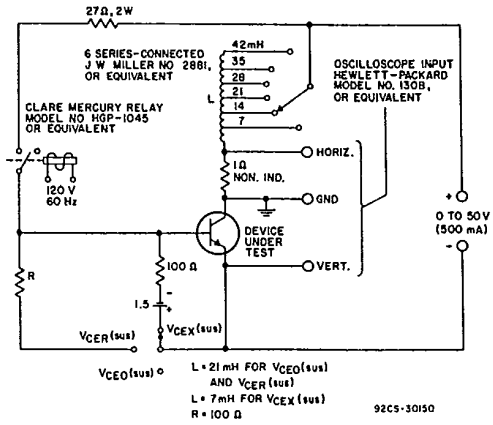


Fig. 8 - Circuit used to measure sustaining voltages $V_{CEO}(sus)$, $V_{CER}(sus)$, and $V_{CEX}(sus)$ for all types.

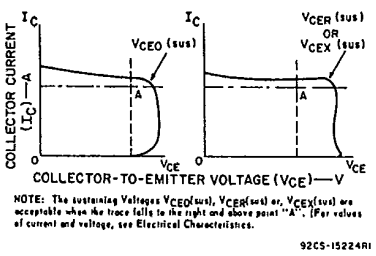


Fig. 9 - Oscilloscope display for measurement of sustaining voltages. (Test circuit shown in Fig. 8).

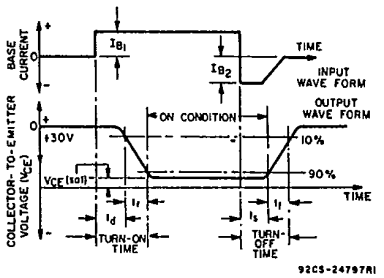


Fig. 10 - Oscilloscope display for measurement of switching times for all types.