

HARRIS SEMICONDUCTOR

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

T-33-01

Rugged Devices, Broadly Applicable For Industrial and Commercial Use

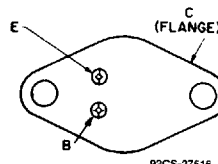
Features:

- 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

POWER TRANSISTORS

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_{CEO}	160	140	140	120	100	V
$V_{CEX}(SUS)$ $V_{BE} = -1.5$ V; $R_{BE} = 100 \Omega$	160	—	—	—	—	V
$V_{CER}(SUS)$ $R_{BE} = 100 \Omega$	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 $T_c \leq 25^\circ C$	150	250	200	200	200	W
At $T_c > 25^\circ C$ Derate Linearly.....	0.857	1.43	—	1.14	—	W/ $^\circ C$
T_{stg}, T_J	—	—	-65 to +200	—	—	$^\circ C$
T_L At distance $\geq 1/32$ in. (0.8 mm) from seating plane for 10 s max.	—	—	230	—	—	$^\circ C$

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} $T_C = 150^\circ C$	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
$V_{CEX(sus)b}$ $R_{BE} = 100\Omega$		-1.5	0.2	160	—	—	—	
$V_{CE(sus)b}$ $R_{BE} \leq 100\Omega$			0.2	150	—	150	—	
$V_{CEO(sus)b}$			0.2	140	—	140	—	
V_{EBO} $I_E = 1\text{ mA}$			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	
$I_{S/b}$ $t_p = 1\text{ s}$ nonrep.	100 50			1.5 —	— —	1 5	— —	A
$ h_{fe} $ $f = 0.5\text{ MHz}$	10		0.5	4	—	4	—	MHz
f_T				2	—	2	—	
h_{fe} $f = 1\text{ kHz}$	4		1	40	—	—	—	pF
C_{ob} $f = 0.1\text{ MHz}$	10 ^a			—	500	—	500	
$R_{\theta JC}$	10		10	—	1.17	—	0.7	°C/W

See page 3 for footnotes.

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HARRIS SEMICONDUCTOR SECTOR

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

T-33-01

CHARAC- TERISTIC	TEST CONDITIONS			LIMITS						UNITS
	VOLTAGE V dc		CUR- RENT A dc	RCA8638C		RCA8638D		RCA8638E		
	V _{CE}	V _{BE}		Min.	Max.	Min.	Max.	Min.	Max.	
I _{CBO}	140 ^a			-	1	-	-	-	-	
	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} ≤ 100Ω			0.2	150	-	130	-	110	-	
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 = 0.5A			7.5 ^c 5 ^c	- -	- 1	- -	- 1	- -	1.5 -	
I _{S/b} t _p = 1 s nonrep.	35			5.71	-	5.71	-	-	-	
	25			-	-	-	-	8	-	
h _{fe} f = 0.5 MHz	10		0.5	4	-	4	-	4	-	
f _T				2	-	2	-	2	-	
C _{ob} f = 0.1 MHz	10 ^a			-	500	-	500	-	500	
R _{θJC}	10		10	-	0.875	-	0.875	-	0.875	

^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.

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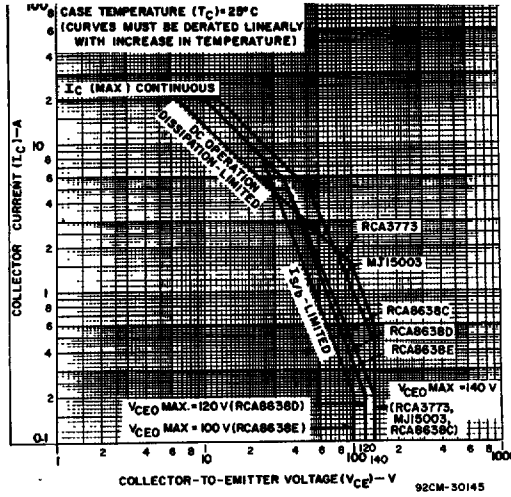


Fig. 1 - Maximum operating areas for all types.

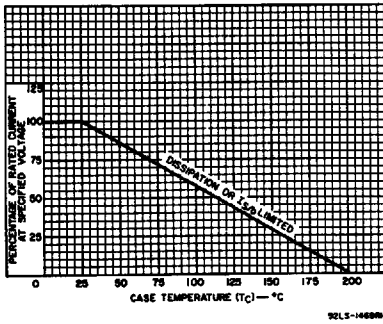


Fig. 2 - Current derating curve for all types.

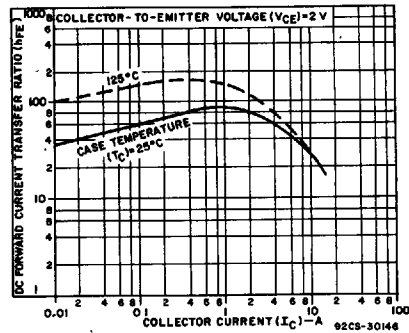


Fig. 3 - Typical dc beta characteristics as a function of collector current for all types.

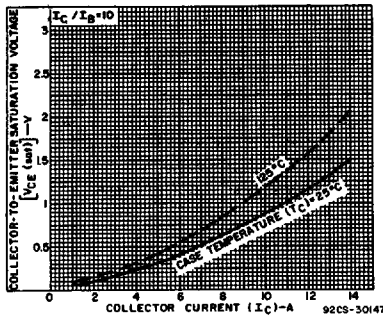


Fig. 4 - Typical saturation voltage characteristics for all types.

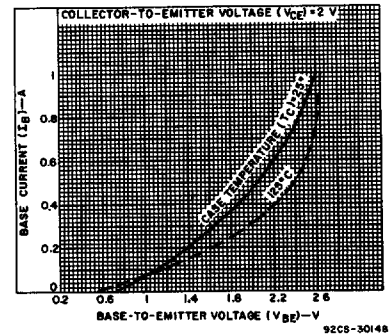


Fig. 5 - Typical input characteristics for all types.

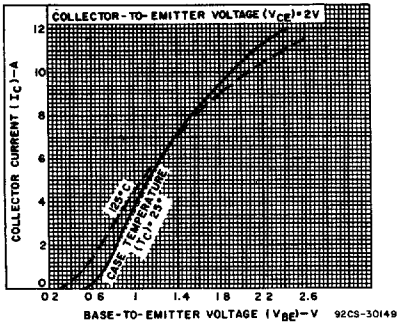


Fig. 6 - Typical transfer characteristics for all types.

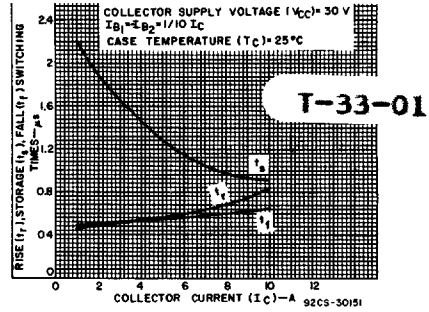


Fig. 7 - Typical saturated-switching times for all types.

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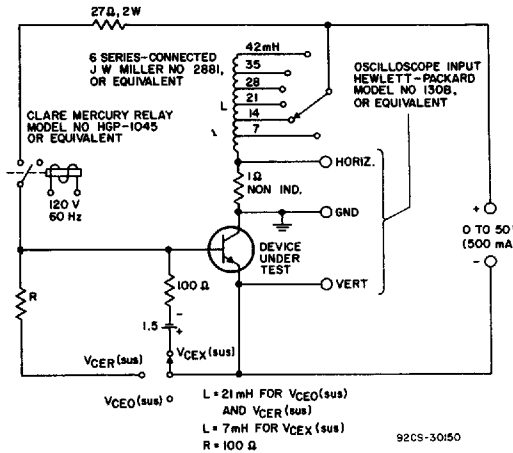
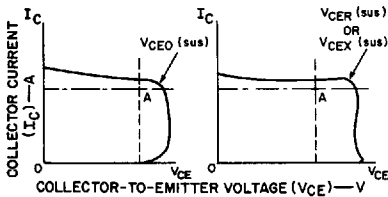


Fig. 8 - Circuit used to measure sustaining voltages $V_{CE0}(sus)$, $V_{CE}(sus)$, and $V_{CEX}(sus)$ for all types.



NOTE: The sustaining voltages $V_{CE0}(sus)$, $V_{CE}(sus)$ or $V_{CEX}(sus)$ are acceptable when the trace falls to the right and above point 'A'. (For values of current and voltage, see Electrical Characteristics)

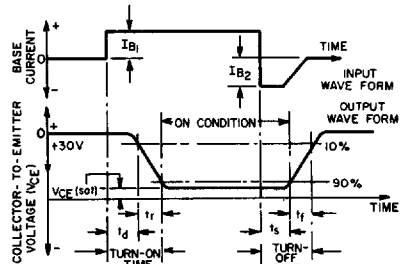


Fig. 10 - Oscilloscope display for measurement of switching times for all types.

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