RCA
Solid State
Division

Power Transistors

40850 40851
40852 40853
40854

40850
40851

JEDEC TO-66

40852
40853
40854

JEDEC TO-3

450-V Silicon N-P-N Types

For Off-Line Switching-Regulator Type Power-Supply Applications

Features:

- **High-voltage ratings for operation from power lines without a step-down transformer**
- **Popular JEDEC TO-3 and TO-66 hermetic packages**

Applications:

- **For use in switching-regulator supplies which feature:**
  - **A substantial reduction in size and weight due to elimination of the 60-Hz power transformer.**
  - **Operation with a substantial reduction of heat**
- **5-V, off-line supplies with current ratings of 25, 50, 100, or 200 A**
- **30-V, off-line supplies with current ratings of 5, 10, 20, or 40 A**

RCA 40850–40854, inclusive, are silicon n-p-n power transistors, selected from RCA's line of silicon power transistors, for power-supply applications. Their high-voltage ratings (450 V) permit operation directly off the power line thereby eliminating the heavy and bulky 60-Hz power transformer.

Their fast switching speeds (t_r plus t_f equal to less than 2.0 μs) permit operation above the audio-frequency range (20 to 30 kHz) for quiet performance, and permit the use of small ferrite-core transformers for changing the voltage level.

These types have sufficient voltage capability to be used as push-pull inverters or pulse-width-modulated inverters operating directly off the 120-V power line.

Types 40850–40854 have sufficient voltage capability to operate as switching regulators off a 240-V line; for 120-V lines, the prototypes can be used.

A brief description of these types, together with prototype identification, is given in the tables on pages 2, 3, and 4.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	40850	40851	40852[□]	40853	40854	
COLLECTOR-TO-BASE VOLTAGE, V_{CBO}	450	450	450	450	450	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE:						
With base open, $V_{CEO(sus)}$	300	350	350	300	300	V
With external base-to-emitter resistance (R_{BE}) ≤ 50 Ω, $V_{CER(sus)}$	400	375	375	375	325	V
EMITTER-TO-BASE VOLTAGE, V_{EBO}	6	9	9	6	6	V
COLLECTOR CURRENT, I_C						
Continuous and Average	2	7	7	10	15	A
Peak (10 ms max.)	5	10	10	15	30	A
CONTINUOUS BASE CURRENT, I_B	1	4	4	5	10	A

□ Formerly RCA-40832.

Continued on following page.

MAXIMUM RATINGS (cont'd):

	40850	40851	40852■	40853	40854	
TRANSISTOR DISSIPATION, P_T: (Power Dissipation-Limited Region*) At case temperaures up to 25°C	35	45	100	100	175	W
At case temperaures above 25°C and in the $I_{S/b}$-Limited Region*	See derating curves in prototype bulletins.					
TEMPERATURE RANGE: Storage & Operating (Junction)	-65 to +200 °C					
PIN TEMPERATURE (During Soldering): At distances ≥1/32 in. (0.8 mm) from case for 10 s max.	230°C					

* Safe-operating-area curves for prototype devices should be extended to the maximum values of collector current given for these devices.
■ Formerly RCA-40832

TERMINAL CONNECTIONS (All Types)
Pin 1 - Base
Pin 2 - Emitter
Mounting Flange, Case - Collector

Type 40850 (For 5-V, 25-A & 30-V, 5-A Power Supplies)
Package: JEDEC TO-66
Application Information: See "RCA Power Circuits" manual SP-52 and RCA Application Note AN3065

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS MIN.	LIMITS MAX.	UNITS
Collector-Cutoff Current:	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V	–	0.2	mA
With base reverse biased	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V, T_C = 125°C	–	2	mA
Collector-to-Emitter Voltage With base open	V_{CEO}[a]	I_C = 0.2 A, I_B = 0	300	–	V
Collector-to-Emitter Voltage With external base-to-emitter resistance (R_{BE})	V_{CER}[a]	I_C = 0.2 A, R_{BE} = 50 Ω	400	–	V
Emitter-to-Base Voltage	V_{EBO}	I_E = 5 mA, I_C = 0	6	–	V
DC Forward-Current Transfer Ratio	h_{FE}	I_C = 0.75 A, V_{CE} = 10 V	25	–	
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 2 A, I_B = 0.4 A	–	2.0	V
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 2 A, I_B = 0.4 A	–	2.0	V
Second-Breakdown Collector Current: With base forward biased	$I_{S/b}$[a]	V_{CE} = 100 V	0.35	–	A
Second-Breakdown Energy: With base reversed biased	$E_{S/b}$[a]	L = 100 μH, $I_{C(PEAK)}$ = 2 A, R = 20 Ω, V_{BE} = -4 V	0.2	–	mJ

[a] For characteristics curves and test conditions, refer to published data for prototype 2N3585 (File 138).

Type 40851 (For 5-V, 50-A & 30-V, 10-A Power Supplies)
Package: JEDEC TO-66
Applications Information: See "RCA Power Circuits" manual SP-52 and RCA Application Note AN4509

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS		UNITS
			MIN.	MAX.	
Collector-Cutoff Current:	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V	–	0.5	mA
With base reverse biased	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V, T_C = 125°C	–	5	mA
Collector-to-Emitter Voltage With base open	V_{CEO}[a]	I_C = 0.2 A, I_B = 0	350	–	V
Collector-to-Emitter Voltage With external base-to-emitter resistance (R_{BE})	V_{CER}[a]	I_C = 0.2 A, R_{BE} = 50 Ω	375	–	V
Emitter-to-Base Voltage	V_{EBO}	I_E = 1 mA, I_C = 0	9	–	V
DC Forward-Current Transfer Ratio	h_{FE}	I_C = 1.2 A, V_{CE} = 1.0 V	12	–	
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)	I_C = 4 A, I_B = 0.8 A	–	3	V
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C = 4 A, I_B = 0.8 A	–	2	V
Second-Breakdown Collector Current: With base forward biased	$I_{S/b}$[a]	V_{CE} = 50 V	0.9	–	A
Second-Breakdown Energy: With base reversed biased	$E_{S/b}$[a]	L = 100 μH, I_C(PEAK) = 3 A, R = 50 Ω V_{BE} = -4 V	0.45	–	mJ

[a] For characteristics curves and test conditions, refer to published data for prototype 2N6079 (File 492).

Type 40852 (For 5-V, 50-A & 30-V, 10-A Power Supplies)
Package: JEDEC TO-3
Applications Information: See "RCA Power Circuits" manual SP-52 and RCA Application Note AN4509

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS		UNITS
			MIN.	MAX.	
Collector-Cutoff Current:	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V	–	0.5	mA
With base reverse biased	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V, T_C = 125°C	–	5	mA
Collector-to-Emitter Voltage With base open	V_{CEO}[a]	I_C = 0.2 A, I_B = 0	350	–	V
Collector-to-Emitter Voltage With external base-to-emitter resistance (R_{BE})	V_{CER}[a]	I_C = 0.2 A, R_{BE} = 50 Ω	375	–	V
Emitter-to-Base Voltage	V_{EBO}	I_E = 1 mA, I_C = 0	9	–	V
DC Forward-Current Transfer Ratio	h_{FE}	I_C = 1.2 A, V_{CE} = 1.0 V	12	–	
Collector-to-Emitter Saturation Voltage	V_{CE} (sat)	I_C = 4 A, I_B = 0.8 A	–	3.0	V
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C = 4 A, I_B = 0.8 A	–	2.0	V
Second-Breakdown Collector Current: With base forward biased	$I_{S/b}$[a]	V_{CE} = 40 V	2.5	–	A
Second-Breakdown Energy: With base reversed biased	$E_{S/b}$[a]	L = 100 μH, I_C(PEAK) = 3 A, R = 50 Ω V_{BE} = -4 V	0.45	–	mJ

[a] For characteristics curves and test conditions, refer to published data for prototype 2N5840 (File 410).

Type 40853 (For 5-V, 100-A & 30-V, 20-A Power Supplies)
Package: JEDEC TO-3
Applications Information: See "RCA Power Circuits" manual SP-52

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS		UNITS
			MIN.	MAX.	
Collector-Cutoff Current:	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V	–	1.0	mA
With base reverse biased	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V, T_C = 125°C	–	10	mA
Collector-to-Emitter Voltage With base open	V_{CEO}[a]	I_C = 0.2 A, I_B = 0	300	–	V
Collector-to-Emitter Voltage With external base-to-emitter resistance (R_{BE})	V_{CER}[a]	I_C = 0.2 A, R_{BE} = 50 Ω	375	–	V
Emitter-to-Base Voltage	V_{EBO}	I_E = 5 mA, I_C = 0	6	–	V
DC Forward-Current Transfer Ratio	h_{FE}	I_C = 5 A, V_{CE} = 4 V	10	–	
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 8 A, I_B = 1.6 A	–	3.0	V
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 8 A, I_B = 1.6A	–	2.0	V
Second-Breakdown Collector Current: With base forward biased	$I_{S/b}$[a]	V_{CE} = 50 V	2.2	–	A
Second-Breakdown Energy: With base reversed biased	$E_{S/b}$[a]	L = 50 μH, I_C(PEAK) = 5 A, R = 20 Ω V_{BE} = -4 V	0.62	–	mJ

[a] For characteristics curves and test conditions, refer to published data for prototype 2N5805 (File 407).

Type 40854 (For 5-V, 200-A & 30-V, 40-A Power Supplies)
Package: JEDEC TO-3
Applications Information: See "RCA Power Circuits" manual SP-52

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS		UNITS
			MIN.	MAX.	
Collector-Cutoff Current:	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V	–	1.0	mA
With base reverse biased	I_{CEV}	V_{CE} = 450 V, V_{BE} = -1.5 V, T_C = 125°C	–	10	mA
Collector-to-Emitter Voltage With base open	V_{CEO}[a]	I_C = 0.2 A, I_B = 0	300	–	V
Collector-to-Emitter Voltage With external base-to-emitter resistance (R_{BE})	V_{CER}[a]	I_C = 0.2 A, R_{BE} = 50 Ω	325	–	V
Emitter-to-Base Voltage	V_{EBO}	I_E = 5 mA, I_C = 0	6	–	V
DC Forward-Current Transfer Ratio	h_{FE}	I_C = 10 A, V_{CE} = 4 V	8	–	
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 16 A, I_B = 3.2 A	–	3.0	V
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 16 A, I_B = 3.2 A	–	3.0	V
Second-Breakdown Collector Current: With base forward biased	$I_{S/b}$[a]	V_{CE} = 30 V	5.8	–	A
Second-Breakdown Energy: With base reversed biased	$E_{S/b}$[a]	L = 50 μH, I_C(PEAK) = 10 A, R = 50 Ω V_{BE} = -4 V	2.5	–	mJ

[a] For characteristics curves and test conditions, refer to published data for prototype 2N6251 (File 523).