

8-A SwitchMax Power Transistors

High-Voltage N-P-N Types for 240 V Off-Line Power Supplies and Other High-Voltage Switching Applications

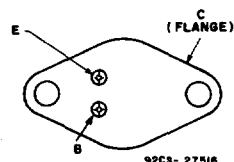
Features:

- High-temperature parameters guaranteed
- Fast switching speed
- High voltage ratings:
 $V_{CEX} = 450 \text{ V} - 550 \text{ V}$
- Low $V_{CE}(\text{sat})$ at $I_C = 8 \text{ A}$
- Steel hermetic TO-204AA package

Applications:

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

TERMINAL DESIGNATIONS



JEDEC TO-204AA

(200 mil diameter pin isolation)

The BUX33 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 100°C to provide information necessary for worst-case design.

The BUX33-series transistors are supplied in steel JEDEC TO-204AA hermetic packages.

MAXIMUM RATINGS, Absolute-Maximum Values:

	BUX33	BUX33A	BUX33B	
V_{CEV}				
$V_{BE} = 1.5 \text{ V}$	800	900	1000	V
$V_{CER} R_{BE} \leq 10 \Omega$	800	900	1000	V
$V_{CEX}(\text{Clamped})$				
$V_{BE} = -1.5 \text{ V}$	450	500	550	V
V_{CEO}	400	450	500	V
V_{EBO}	8	8	8	V
$I_C(\text{sat})$	8	8	8	A
I_C	12	12	12	A
I_{CM}	15	15	15	A
I_B	4	4	4	A
P_T				
T_C up to 25°C	150	150	150	W
T_C above 25°C, derate linearly	1.0	1.0	1.0	W/°C
T_J	-65 to 175	-65 to 175	-65 to 175	°C
T_{stg}	-65 to 200	-65 to 200	-65 to 200	°C
T_L				
At distance $\geq 1/16$ in. (1.58 mm) from seating plane for 10 s max.	235	235	235	°C

BUX33, BUX33A, BUX33B

ELECTRICAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS											
CHARAC- TERISTIC	TEST CONDITIONS				LIMITS						UNITS
	VOLTAGE		CURRENT		BUX33		BUX33A		BUX33B		
	V dc		A dc								
	V _{CE}	V _{BE}	I _C	I _B	Min.	Max.	Min.	Max.	Min.	Max.	

T_C = 25° C

I _{CEV}	800	-1.5			—	0.1	—	—	—	—	mA
	900	-1.5			—	—	—	0.1	—	—	
	1000	-1.5			—	—	—	—	—	0.1	
I _{CER} R _{BE} ≤ 10 Ω	800				—	0.2	—	—	—	—	mA
	900				—	—	—	0.2	—	—	
	1000				—	—	—	—	—	0.2	
I _{EBO}		-8	0		—	2	—	2	—	2	V
V _{CE0} (SUS) ^b			0.2 ^a	0	400	—	450	—	500	—	
h _{FE}	3		8		6	40	6	40	6	40	V
V _{BE} (sat)			8	2	—	1.3	—	1.3	—	1.3	
V _{CE} (sat)			8	2	—	1	—	1	—	1	
			12	3	—	4	—	4	—	4	
V _{CEX} ^b (Clamped E _{S/B}) L = 170 μH		-5	8	2	450	—	500	—	550	—	
I _{S/B}	30		5		1	—	1	—	1	—	s
h _{re} f = 5 MHz	10		0.2		3	12	3	12	3	12	MHz
f _T	10		0.2		15	60	15	60	15	60	
C _{obo} f = 0.1 MHz	10 ^c				50	250	50	250	50	250	pF
t _d ^d			8	2	—	0.1	—	0.1	—	0.1	μs
t _r ^d			8	2	—	0.45	—	0.45	—	0.45	
t _s ^d			8	2 ^e	—	3.0	—	3.0	—	3.0	
t _f ^d			8	2 ^e	—	0.4	—	0.4	—	0.4	
t _c V _{CC} = 240 V, L = 170 μH, R _C = 30 Ω Collector clamped to V _{CEX}			8	2 ^e	—	0.4	—	0.4	—	0.4	

T_C = 100° C

I _{CEV}	800	-1.5			—	1	—	—	—	—	mA
	900	-1.5			—	—	—	1	—	—	
	1000	-1.5			—	—	—	—	—	1	
I _{CER} R _{BE} ≤ 10 Ω	800				—	3	—	—	—	—	mA
	900				—	—	—	3	—	—	
	1000				—	—	—	—	—	3	
V _{CE} (sat)			8	2	—	1.5	—	1.5	—	1.5	V
t _d ^d			8	2	—	0.6	—	0.6	—	0.6	μs
t _s ^d			8	2 ^e	—	4	—	4	—	4	
t _f ^d			8	2 ^e	—	0.7	—	0.7	—	0.7	
t _c V _{CC} = 240 V, L = 170 μH, R _C = 30 Ω Collector clamped to V _{CEX}			8	2 ^e	—	0.8	—	0.8	—	0.8	
R _{θJC}	10	5			—	1.0	—	1.0	—	1.0	°C/W

^aPulsed; pulse duration = 300 μs, duty factor ≤ 2%.

^bCAUTION: The sustaining voltage V_{CE0}(sus) and V_{CEX} MUST NOT be measured on a curve tracer.

^cV_{CE} value.

^dV_{CC} = 240 V, t_p = 20 μs.

^eI_{B1} = -I_{B2}.

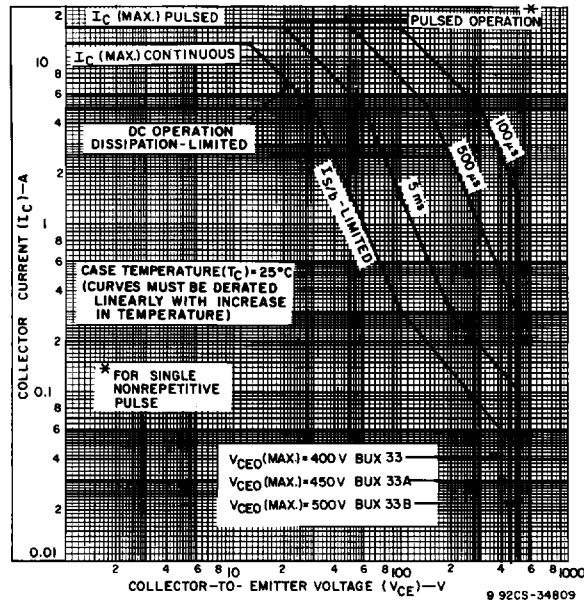


Fig. 1 — Maximum operating areas for all types (T_c).

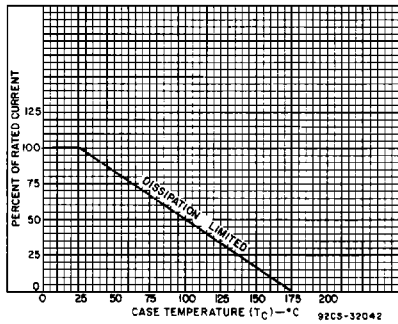


Fig. 2 — Dissipation derating curve for all types.

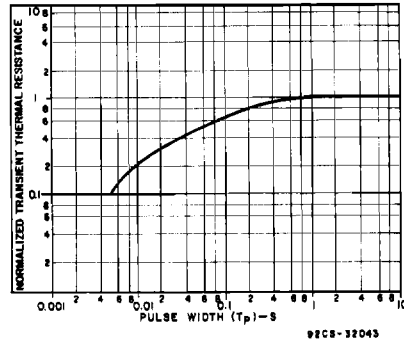


Fig. 3 — Typical thermal-response characteristic for all types.

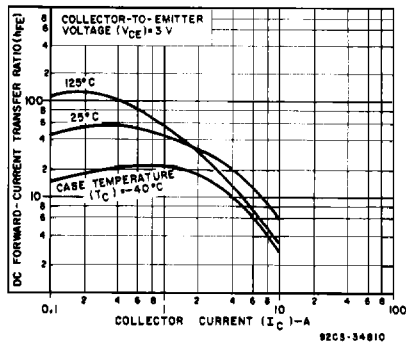


Fig. 4 — Typical dc beta characteristics for all types.

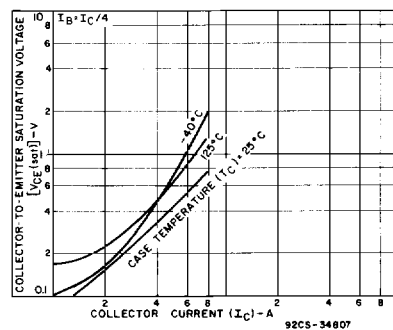


Fig. 5 — Typical collector-to-emitter saturation voltage for all types.

BUX33, BUX33A, BUX33B

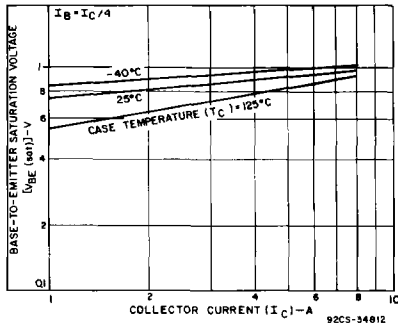


Fig. 6 — Typical base-to-emitter saturation voltage as a function of collector current for all types.

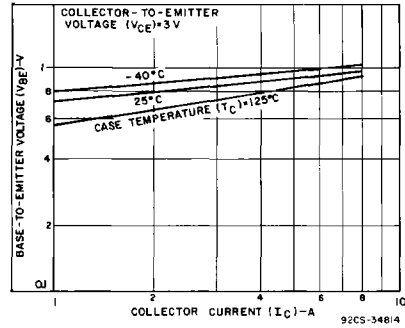


Fig. 7 — Typical base-to-emitter voltage as a function of collector current for all types.

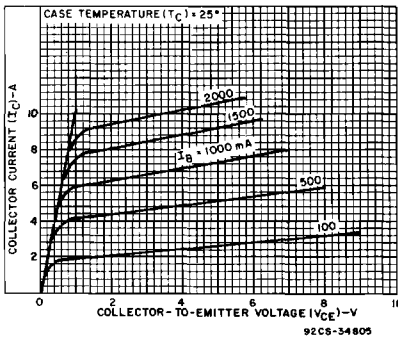


Fig. 8 — Typical output characteristics for all types.

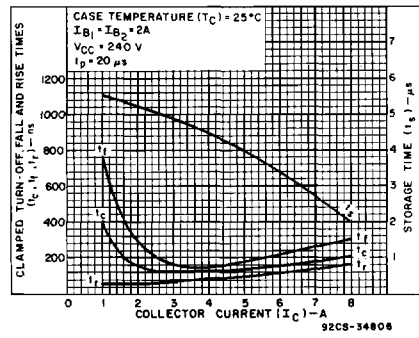


Fig. 9 — Typical saturated switching time characteristics for all types.

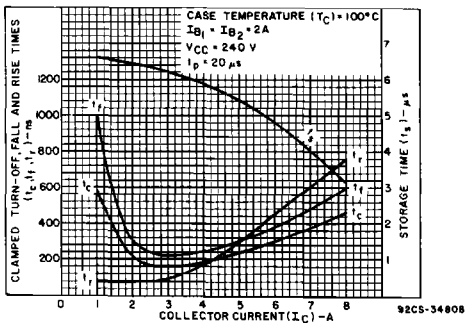


Fig. 10 — Typical saturated switching time characteristics for all types.

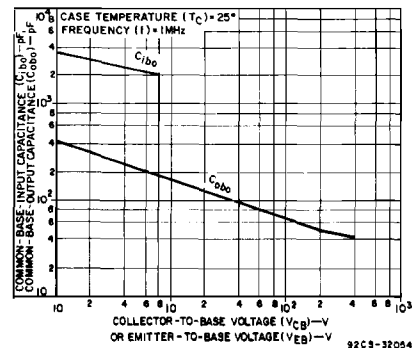


Fig. 11 — Typical common-base input or output capacitance characteristics as a function of collector-to-base voltage or emitter-to-base voltage for all types.

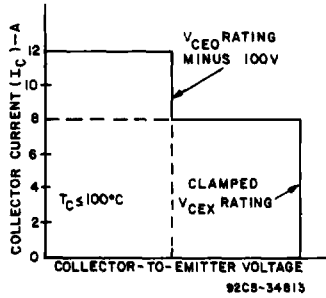


Fig. 12 — Maximum operating conditions for switching between saturation and cutoff.

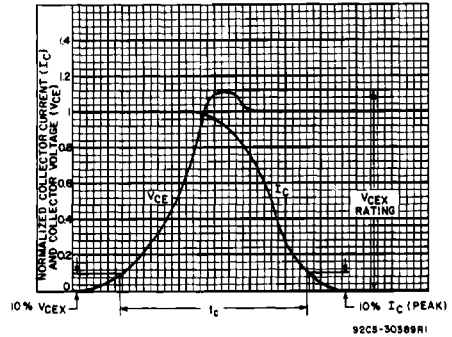


Fig. 13 — Oscilloscope display for measurement of clamped induction switching time (t_c).

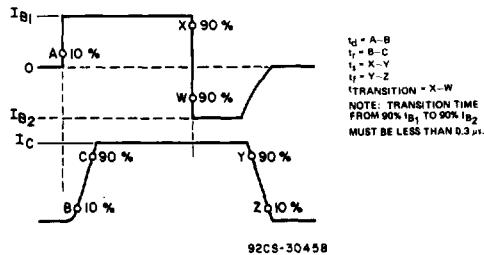


Fig. 14 — Phase relationship between input and output current showing reference points for specification of switching times.

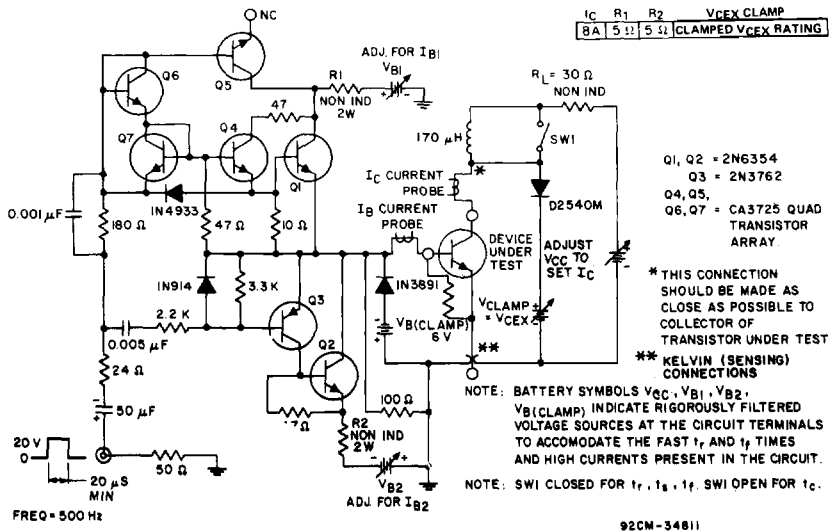


Fig. 15 — Circuit for measuring switching times.