6-A *SwitchMax* Power Transistors

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

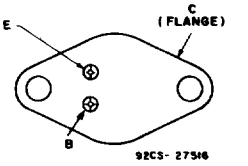
Features:

- *High-temperature parameters guaranteed*
- *Fast switching speed*
- *High voltage ratings:* V_{CEX} *= 450 V — 550 V*
- *Low* V_{CE} *(sat) at* I_C *= 6 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 BUX32 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 BUX32-series transistors are supplied in steel JEDEC TO-204AA hermetic packages.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	BUX32	BUX32A	BUX32B	
V_{CEV}				
V_{BE}=-1.5 V	800	900	1000	V
V_{CER} $R_{BE} \leq 10\ \Omega$	800	900	1000	V
V_{CEX} (Clamped)				
V_{BE}=-1.5 V	450	500	550	V
V_{CEO}	400	450	500	V
V_{EBO}	8			V
I_C(sat)	6			A
I_C	8			A
I_{CM}	10			A
I_B	4			A
P_T				
T_C up to 25°C	150			W
T_C above 25°C, derate linearly	1.0			W/°C
T_J	-65 to 175			°C
T_{stg}	-65 to 200			°C
T_L				
At distance ≥ 1/16 in. (1.58 mm) from seating plane for 10 s max.	235			°C

ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	TEST CONDITIONS				LIMITS						UNITS
	VOLTAGE V dc		CURRENT A dc		BUX32		BUX32A		BUX32B		
	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} $R_{BE} \leq 10\ \Omega$	800				—	0.2	—	—	—	—	
	900				—	—	—	0.2	—	—	
	1000				—	—	—	—	—	0.2	
I_{EBO}		-8	0		—	2	—	2	—	2	
$V_{CEO(sus)}$[b]			0.2[a]	0	400	—	450	—	500	—	V
h_{FE}	3		6		8	40	8	40	8	40	
$V_{BE(sat)}$			6	1.2	—	1.3	—	1.3	—	1.3	V
$V_{CE(sat)}$			6	1.2	—	1	—	1	—	1	
			8	2	—	2	—	2	—	2	
V_{CEX}[b] (Clamped $E_{S/b}$) L=170 μH		-5	6	1.2[e]	450	—	500	—	550	—	
$I_{S/b}$	30		5		1	—	1	—	1	—	s
$\|h_{fe}\|$ f=5 MHz	10		0.2		3	12	3	12	3	12	
f_T	10		0.2		15	60	15	60	15	60	MHz
C_{obo} f=0.1 MHz	10[c]				50	250	50	250	50	250	pF
t_d[d]			6	1.2	—	0.1	—	0.1	—	0.1	μs
t_r[d]			6	1.2	—	0.45	—	0.45	—	0.45	
t_s[d]			6	1.2[e]	—	3.0	—	3.0	—	3.0	
t_f[d]			6	1.2[e]	—	0.4	—	0.4	—	0.4	
t_c V_{CC}=250 V, L=170 μH, R_C=50 Ω Collector clamped to V_{CEX}			6	1.2[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} $R_{BE} \leq 10\ \Omega$	800				—	3	—	—	—	—	
	900				—	—	—	3	—	—	
	1000				—	—	—	—	—	3	
$V_{CE(sat)}$			6	1.2	—	1.5	—	1.5	—	1.5	V
t_j[d]			6	1.2	—	0.6	—	0.6	—	0.6	μs
t_s[d]			6	1.2[e]	—	4	—	4	—	4	
t_f[d]			6	1.2[e]	—	0.7	—	0.7	—	0.7	
t_c V_{CC}=250 V, L=170 μH, R_C=50 Ω Collector clamped to V_{CEX}			6	1.2[e]	—	0.8	—	0.8	—	0.8	

ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	TEST CONDITIONS				LIMITS						UNITS
	VOLTAGE V dc		CURRENT A dc		BUX32		BUX32A		BUX32B		
	V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	Min.	Max.	
$R_{\theta JC}$	10	5			—	1.0	—	1.0	—	1.0	°C/W

[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}=250 V, t_p=20 μs.

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

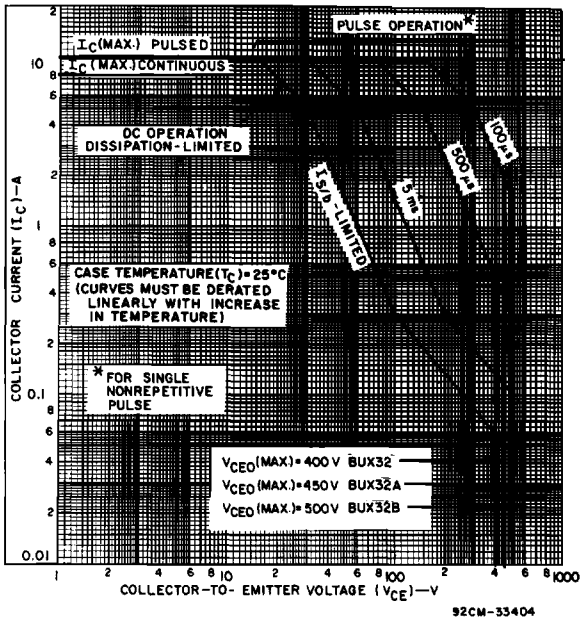


Fig. 1 — Maximum operating areas for all types (T_C).

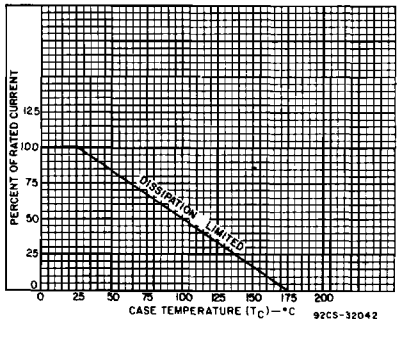


Fig. 2 — Dissipation derating curve for all types.

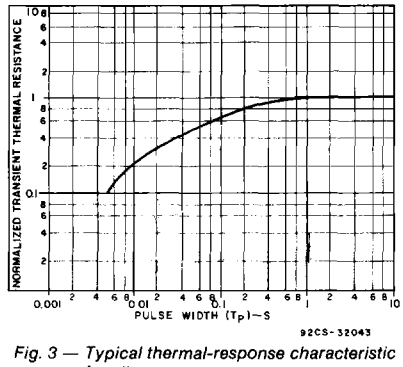


Fig. 3 — Typical thermal-response characteristic for all types.

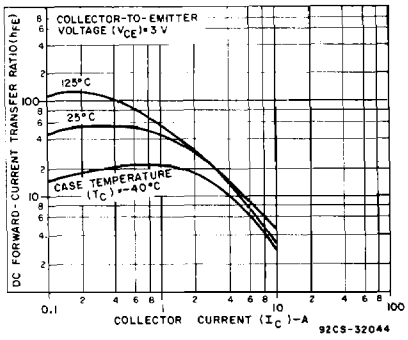


Fig. 4 — Typical dc beta characteristics for all types.

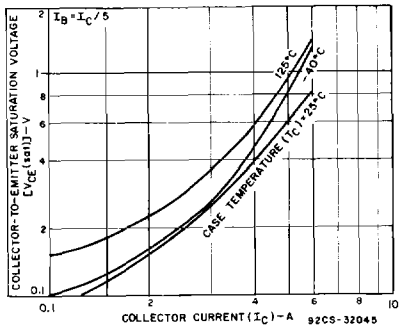


Fig. 5 — Typical collector-to-emitter saturation voltage as a function of collector current for all types.

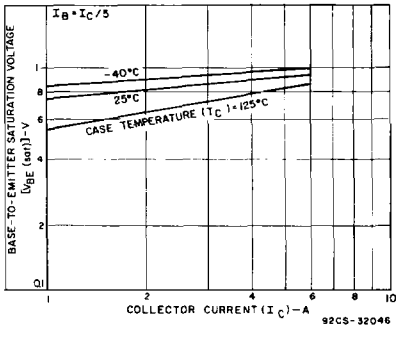


Fig. 6 — Typical base-to-emitter saturation voltage as a function of collector current for all types.

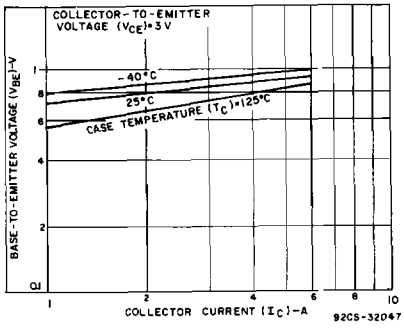


Fig. 7 — Typical base-to-emitter voltage as a function of collector current for all types.

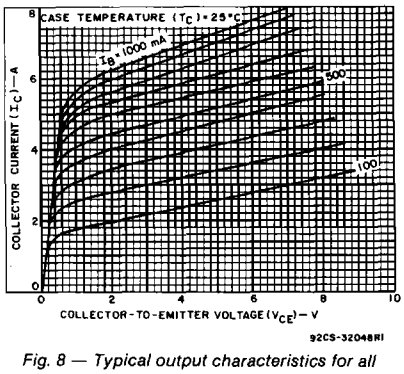


Fig. 8 — Typical output characteristics for all types.

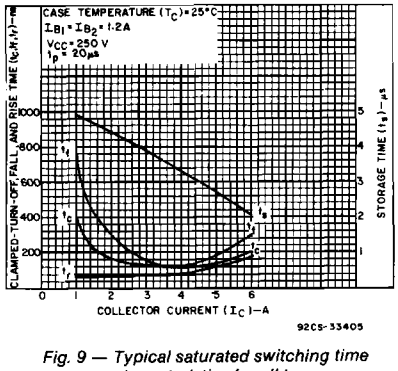


Fig. 9 — Typical saturated switching time characteristics for all types.

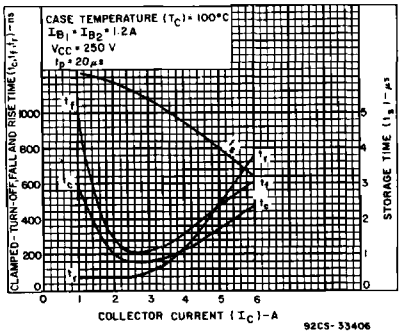


Fig. 10 — Typical saturated switching time characteristics for all types.

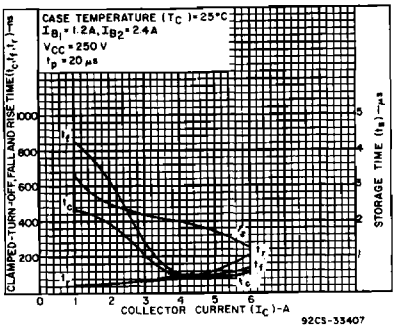


Fig. 11 — Typical saturated switching time characteristics for all types.

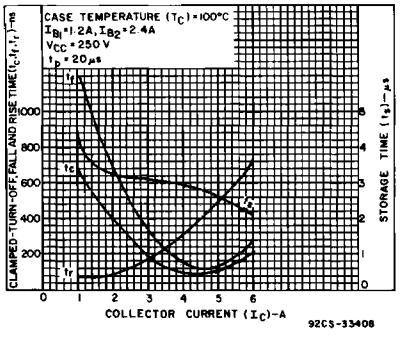


Fig. 12 — Typical saturated switching time characteristics for all types.

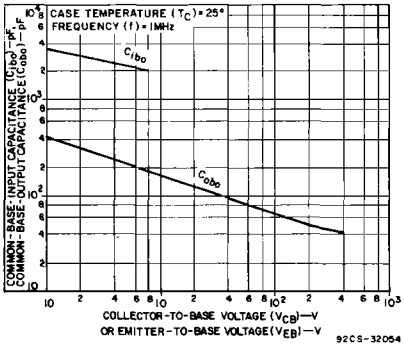


Fig. 13 — Typical common-base input or output capacitance characteristics as a function of collector-to-base voltage or emitter-to-base voltage for all types.

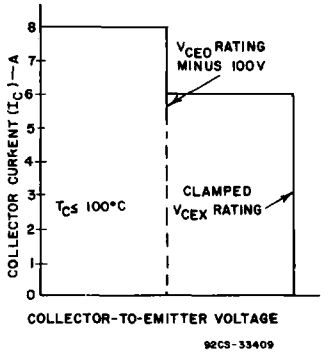


Fig. 14 — Maximum operating conditions for switching between saturation and cutoff.

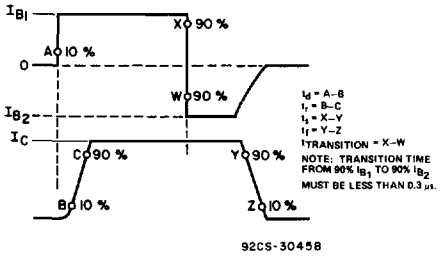


Fig. 15 — Phase relationship between input and output current showing reference points for specification of switching times.

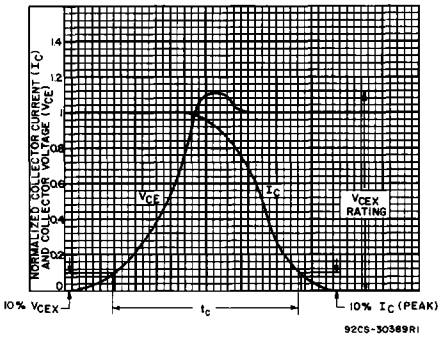


Fig. 16 — Oscilloscope display for measurement of clamped induction switching time (t_c).

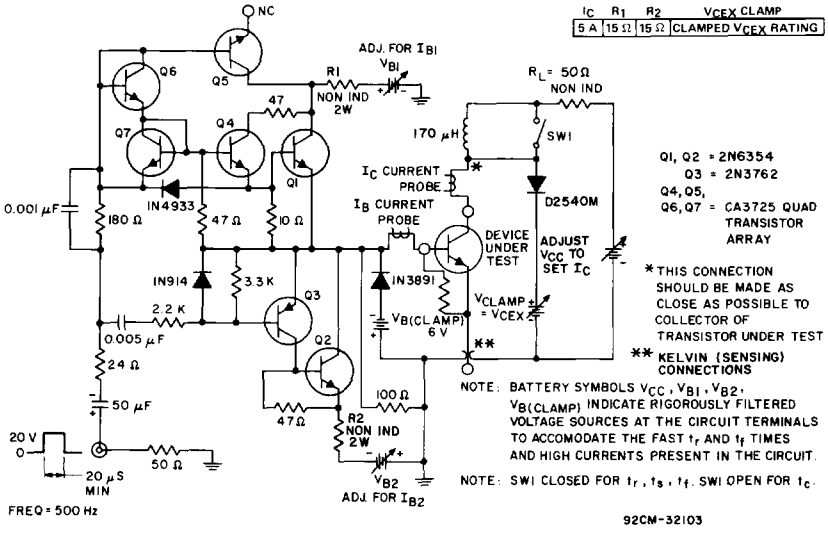


Fig. 17 — Circuit for measuring switching times.