

BUF410A

High voltage fast-switching NPN power transistor

Features

- High voltage capability
- Very high switching speed
- Minimum lot-to-lot spread for reliable operation
- Low base-drive requirements

Applications

- Switch mode power supplies
- Motor control

Description

The BUF410A is manufactured using high voltage multi epitaxial planar technology for high switching speeds and high voltage capacity. It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA.

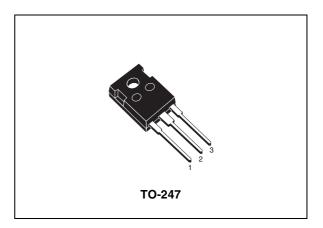


Figure 1. Internal schematic diagram

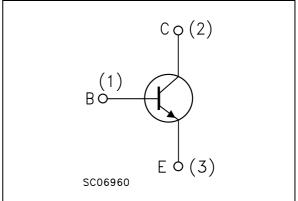


Table 1.	Device	summarv
	DCVICC	Summary

Order code	Marking	Package	Packaging
BUF410A	BUF410A	TO-247	Tube

1 Electrical ratings

Symbol	Parameter	Value	Unit	
V_{CEV}	Collector-emitter voltage (V _{BE} = -1.5 V)	1000	V	
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	450	V	
V_{EBO}	Emitter-base voltage (I _C = 0)	7	V	
۱ _C	Collector current 15		Α	
I _{CM}	Collector peak current (t _P < 5 ms)	30	А	
Ι _Β	Base current	3	Α	
I _{BM}	Base peak current (t _P < 5 ms)	4.5	Α	
P _{tot}	Total dissipation at $T_c = 25 \text{ °C}$	125	W	
T _{stg}	Storage temperature -65 to 150		°C	
TJ	Max. operating junction temperature	150	°C	

Table 2. Absolute maximum ratings

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R _{thj-case}	Thermal resistance junction-case max	1	°C/W

2 Electrical characteristics

(T_{case} = 25 °C unless otherwise specified)

Table 4.	Electrical	character	ristics

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I _{CER}	Collector cut-off current (R _{BE} = 10 Ω)	V _{CE} = 1000 V V _{CE} = 1000 V T _C = 100 °C			0.2 1	mA mA
ICEV	Collector cut-off current (V _{BE} = -1.5 V)	V _{CE} = 1000 V V _{CE} = 1000 V T _C = 100 °C			0.2 1	mA mA
I _{EBO}	Emitter cut-off current $(I_{\rm C} = 0)$	V _{EB} = 5 V			1	mA
V _{CEO(sus)} ⁽¹⁾	Collector-emitter sustaining voltage (I _B = 0)	I _C = 200 mA	450			v
V _{EBO}	Emitter-base voltage (I _C = 0)	I _E = 50 mA	7			V
V _{CE(sat)} ⁽¹⁾	Collector-emitter saturation voltage	$\begin{aligned} I_{C} &= 5 \text{ A} I_{B} &= 0.5 \text{ A} \\ I_{C} &= 5 \text{ A} I_{B} &= 0.5 \text{ A} T_{C} &= 100 \text{ °C} \\ I_{C} &= 10 \text{ A} I_{B} &= 2 \text{ A} \\ I_{C} &= 10 \text{ A} I_{B} &= 2 \text{ A} T_{C} &= 100 \text{ °C} \end{aligned}$		0.8 0.5	2.8 2	V V V V
V _{BE(sat)} ⁽¹⁾	Base-emitter saturation voltage	$\begin{split} I_{C} &= 5 \text{ A} I_{B} &= 0.5 \text{ A} \\ I_{C} &= 5 \text{ A} I_{B} &= 0.5 \text{ A} T_{C} &= 100 \text{ °C} \\ I_{C} &= 10 \text{ A} I_{B} &= 2 \text{ A} \\ I_{C} &= 10 \text{ A} I_{B} &= 2 \text{ A} T_{C} &= 100 \text{ °C} \end{split}$		0.9 1.1	1.5 1.5	V V V V
di _{c /} dt	Rate of rise on-state collector current	$\begin{split} V_{CC} &= 300 \ V & R_C = 0 & t_p = 3 \ \mu s \\ I_{B1} &= 0.75 \ A & T_C = 25 \ ^\circ C \\ I_{B1} &= 0.75 \ A & T_C = 100 \ ^\circ C \\ I_{B1} &= 3 \ A & T_C = 100 \ ^\circ C \end{split}$	45 100	60		A/μs A/μs A/μs
V _{CE(dyn)}	Collector-emitter dynamic voltage (3 µs)			2.1	8	v v
V _{CE(dyn)}	Collector-emitter dynamic voltage (5 µs)	$V_{CC} = 300 \text{ V}$ $R_C = 60 \Omega$ $I_{B1} = 0.75 \text{ A}$ $T_C = 25 \text{ °C}$ $I_{B1} = 0.75 \text{ A}$ $T_C = 100 \text{ °C}$		1.1	4	V V
t _s t _f t _c	Inductive load Storage time Fall time Cross over time	$\begin{split} I_{C} &= 5 \text{ A} & V_{CC} &= 50 \text{ V} \\ V_{BB} &= -5 \text{ V} & R_{BB} &= 1.2 \Omega \\ V_{Clamp} &= 400 \text{ V} & I_{B1} &= 0.5 \text{ A} \\ L &= 0.5 \text{ mH} \end{split}$		0.8 0.05 0.08		μs μs μs



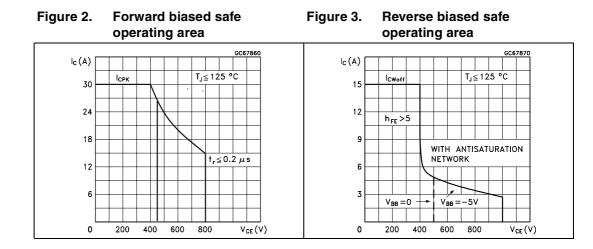
Symbol	Parameter	Test conditions		Parameter Test conditions Min. T		Тур.	Typ. Max.	Unit
t _s t _f t _c	Inductive load Storage time Fall time Cross over time	$V_{BB} = -5 V$ $V_{Clamp} = 400 V$				1.8 0.1 0.18	μs μs μs	
V _{CEW}	Maximum collector emitter voltage without snubber	$I_{C} = 5 \text{ A}$ $V_{BB} = -5 \text{ V}$ $I_{B1} = 0.5 \text{ A}$ $T_{C} = 125 \text{ °C}$	$V_{CC} = 50 V$ $R_{BB} = 1.2 \Omega$ L = 0.5 mH	500			V	
t _s t _f t _c	Inductive load Storage time Fall time Cross over time	$I_{C} = 5 \text{ A}$ $V_{BB} = 0$ $V_{Clamp} = 400 \text{ V}$ $L = 0.5 \text{ mH}$			1.5 0.04 0.07		μs μs μs	
t _s t _f t _c	Inductive load Storage time Fall time Cross over time	•				3 0.15 0.25	μs μs μs	
V _{CEW}	Maximum collector emitter voltage without snubber	$V_{BB} = 0$	$V_{CC} = 50 V$ $R_{BB} = 0.3 \Omega$ $L = 0.5 mH$	500			V	
t _s t _f t _c	Inductive load Storage time Fall time Cross over time	$I_{C} = 10 \text{ A}$ $V_{BB} = -5 \text{ V}$ $V_{Clamp} = 400 \text{ V}$ L = 0.25 mH			1.9 0.06 0.12		μs μs μs	
t _s t _f t _c	Inductive load Storage time Fall time Cross over time	$I_{C} = 10 \text{ A}$ $V_{BB} = -5 \text{ V}$ $V_{Clamp} = 400 \text{ V}$ L = 0.25 mH	R _{BB} = 1.2 Ω			3.2 0.12 0.3	μs μs μs	
V _{CEW}	Maximum collector emitter voltage without snubber	$I_{C} = 15 \text{ A}$ $V_{BB} = -5 \text{ V}$ $I_{B1} = 3 \text{ A}$ $T_{C} = 125 \text{ °C}$	V _{CC} = 50 V R _{BB} = 1.2 Ω L = 0.1 mH	400			V	

 Table 4.
 Electrical characteristics (continued)

1. Pulse duration = 300 μ s, duty cycle \leq 1.5%

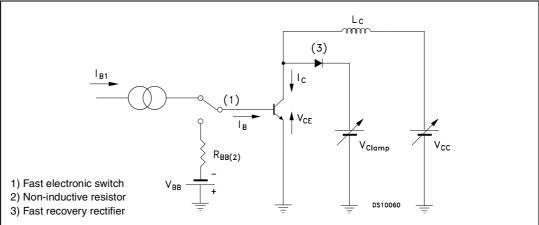


2.1 Electrical characteristics (curves)



2.2 Test circuit

Figure 4. Inductive load switching test circuit



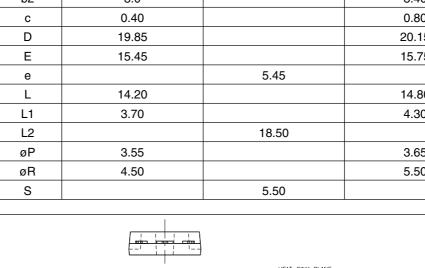
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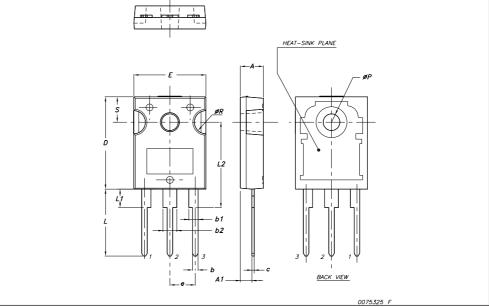
3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com



	TO-247 Mechanical data				
Dim.		mm.			
0	Min.	Тур	Max.		
А	4.85		5.15		
A1	2.20		2.60		
b	1.0		1.40		
b1	2.0		2.40		
b2	3.0		3.40		
С	0.40		0.80		
D	19.85		20.15		
Е	15.45		15.75		
е		5.45			
L	14.20		14.80		
L1	3.70		4.30		
L2		18.50			
øP	3.55		3.65		
øR	4.50		5.50		
S		5.50			







4 Revision history

Table 5.Document revision history

Date	Revision	Changes
18-Mar-2002	2	
13-Mar-2008	3	Package change from TO-218 to TO-247.



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