



BUF410A

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- STMicroelectronics PREFERRED SALESTYPE
- HIGH VOLTAGE CAPABILITY
- VERY HIGH SWITCHING SPEED
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- LOW BASE-DRIVE REQUIREMENTS

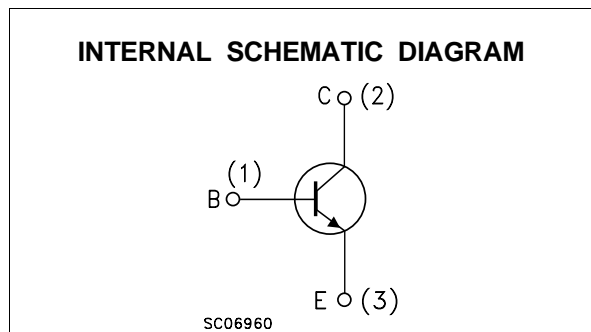
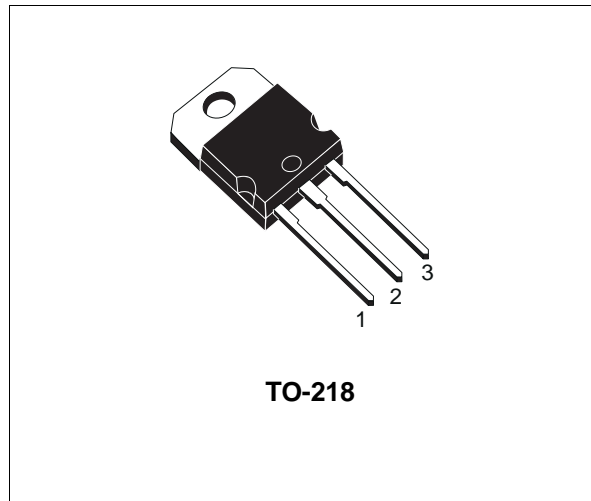
APPLICATIONS:

- 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.

The BUF series is designed for use in high-frequency power supplies and motor control applications.



ABSOLUTE MAXIMUM 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
I_C	Collector Current	15	A
I_{CM}	Collector Peak Current ($t_p < 5$ ms)	30	A
I_B	Base Current	3	A
I_{BM}	Base Peak Current ($t_p < 5$ ms)	4.5	A
P_{tot}	Total Dissipation at $T_c = 25$ °C	125	W
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max Operation Junction Temperature	150	°C

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THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-Case	Max	1	°C/W
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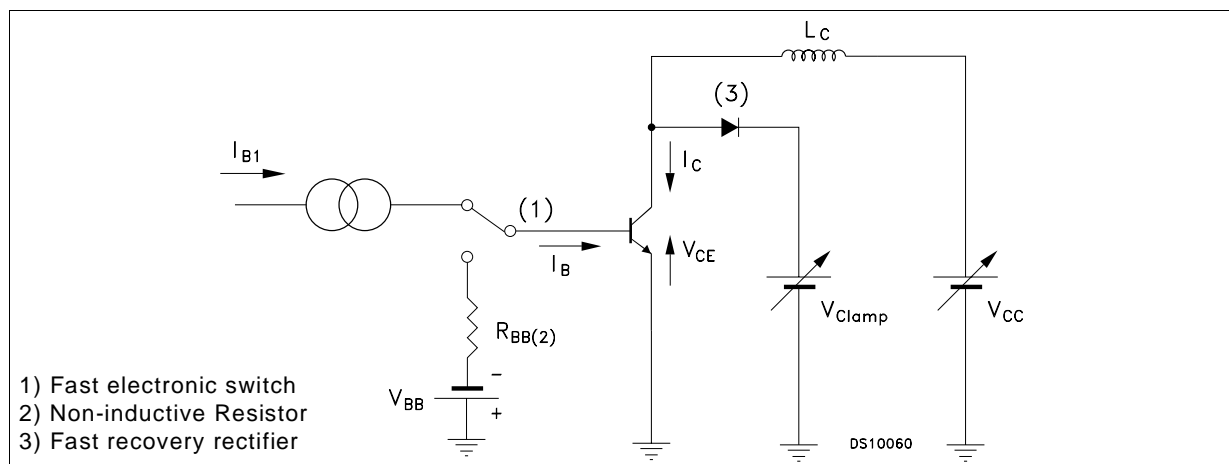
ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _{CEr}	Collector Cut-off Current (R _{BE} = 10 Ω)	V _{CE} = 1000 V			0.2	mA
		V _{CE} = 1000 V T _C = 100 °C			1	mA
I _{CEV}	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 _C = 0)	V _{EB} = 5 V			1	mA
V _{CEO(sus)*}	Collector-Emitter Sustaining Voltage (I _B = 0)	I _C = 200 mA L = 25 mH	450			V
V _{EBO}	Emitter Base Voltage (I _C = 0)	I _E = 50 mA	7			V
V _{CE(sat)*}	Collector-Emitter Saturation Voltage	I _C = 5 A I _B = 0.5 A		0.8		V
		I _C = 5 A I _B = 0.5 A T _C = 100 °C			2.8	V
		I _C = 10 A I _B = 2 A		0.5		V
		I _C = 10 A I _B = 2 A T _C = 100 °C			2	V
V _{BE(sat)*}	Base-Emitter Saturation Voltage	I _C = 5 A I _B = 0.5 A		0.9		V
		I _C = 5 A I _B = 0.5 A T _C = 100 °C			1.5	V
		I _C = 10 A I _B = 2 A		1.1		V
		I _C = 10 A I _B = 2 A T _C = 100 °C			1.5	V
di _C /dt	Rate of rise on-state Collector Current	V _{CC} = 300 V R _C = 0 t _p = 3 μs				
		I _{B1} = 0.75 A T _C = 25 °C		60		A/μs
		I _{B1} = 0.75 A T _C = 100 °C	45			A/μs
		I _{B1} = 3 A T _C = 100 °C	100			A/μs
V _{CE(3μs)}	Collector-Emitter Dynamic Voltage	V _{CC} = 300 V R _C = 60 Ω				
		I _{B1} = 0.75 A T _C = 25 °C		2.1		V
		I _{B1} = 0.75 A T _C = 100 °C			8	V
V _{CE(5μs)}	Collector-Emitter Dynamic Voltage	V _{CC} = 300 V R _C = 60 Ω				
		I _{B1} = 0.75 A T _C = 25 °C		1.1		V
		I _{B1} = 0.75 A T _C = 100 °C			4	V
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	I _C = 5 A V _{CC} = 50 V				
		V _{BB} = - 5 V R _{BB} = 1.2 Ω		0.8		μs
		V _{clamp} = 400 V I _{B1} = 0.5 A		0.05		μs
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	I _C = 5 A V _{CC} = 50 V				
		V _{BB} = - 5 V R _{BB} = 1.2 Ω			1.8	μs
		V _{clamp} = 400 V I _{B1} = 0.5 A			0.1	μs
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	I _C = 5 A V _{CC} = 50 V				
		V _{BB} = 0 R _{BB} = 0.3 Ω		1.5		μs
		V _{clamp} = 400 V I _{B1} = 0.5 A		0.04		μs
V _{CEW}	Maximum Collector Emitter Voltage without Snubber	I _C = 5 A V _{CC} = 50 V	500			V
		V _{BB} = - 5 V R _{BB} = 1.2 Ω				
		I _{B1} = 0.5 A L = 0.5 mH				
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	I _C = 5 A V _{CC} = 50 V				
		V _{BB} = 0 R _{BB} = 0.3 Ω		1.5		μs
		V _{clamp} = 400 V I _{B1} = 0.5 A		0.04		μs
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	I _C = 5 A V _{CC} = 50 V				
		V _{BB} = 0 R _{BB} = 0.3 Ω		1.5		μs
		V _{clamp} = 400 V I _{B1} = 0.5 A		0.04		μs
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	I _C = 5 A V _{CC} = 50 V				
		V _{BB} = 0 R _{BB} = 0.3 Ω		1.5		μs
		V _{clamp} = 400 V I _{B1} = 0.5 A		0.04		μs

ELECTRICAL CHARACTERISTICS (continued)

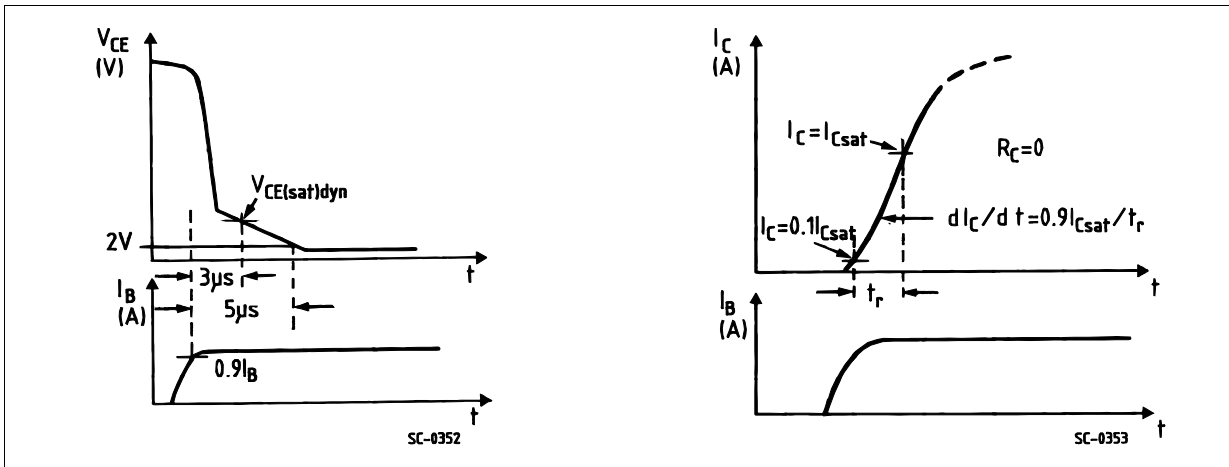
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_C = 5\text{ A}$ $V_{BB} = 0$ $V_{clamp} = 400\text{ V}$ $L = 0.5\text{ mH}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 0.3\ \Omega$ $I_{B1} = 0.5\text{ A}$ $T_C = 100^\circ\text{C}$			3 0.15 0.25	μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	$I_C = 5\text{ A}$ $V_{BB} = 0$ $I_{B1} = 0.5\text{ A}$ $T_C = 125^\circ\text{C}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 0.3\ \Omega$ $L = 0.5\text{ mH}$	500			V
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_C = 10\text{ A}$ $V_{BB} = -5\text{ V}$ $V_{clamp} = 400\text{ V}$ $L = 0.25\text{ mH}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 1.2\ \Omega$ $I_{B1} = 2\text{ A}$		1.9 0.06 0.12		μs μs μs
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_C = 10\text{ A}$ $V_{BB} = -5\text{ V}$ $V_{clamp} = 400\text{ V}$ $L = 0.25\text{ mH}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 1.2\ \Omega$ $I_{B1} = 2\text{ A}$ $T_C = 100^\circ\text{C}$			3.2 0.12 0.3	μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	$I_{C\text{Woff}} = 15\text{ A}$ $V_{BB} = -5\text{ V}$ $L = 0.1\text{ mH}$ $T_C = 125^\circ\text{C}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 1.2\ \Omega$ $I_{B1} = 3\text{ A}$	400			V

Inductive Load Switching Test Circuit

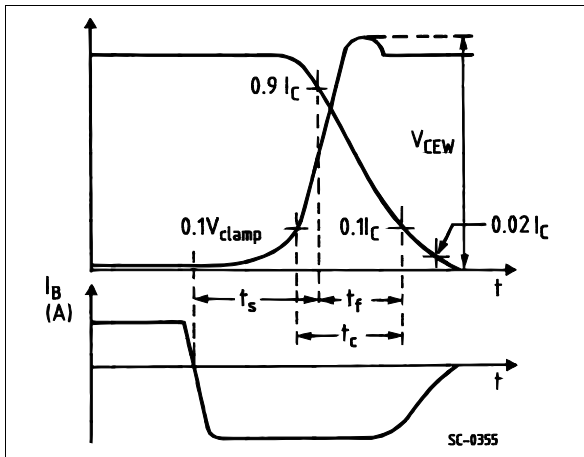


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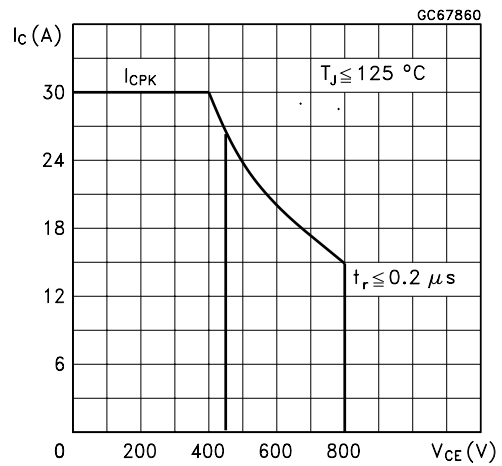
Turn-on Switching Test Waveforms.



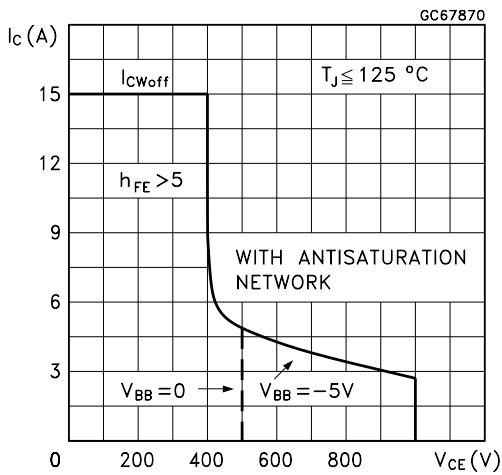
Turn-off Switching Test Waveforms (inductive load).



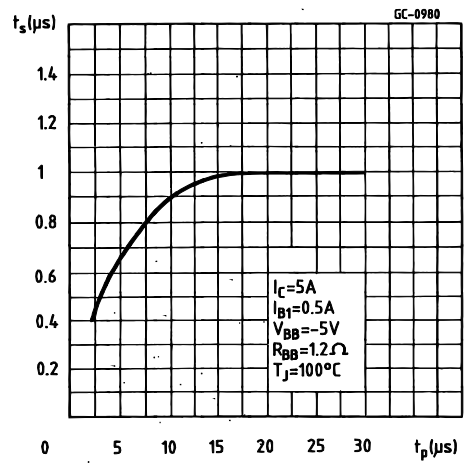
Forward Biased Safe Operating Areas.



Reverse Biased Safe Operating Area

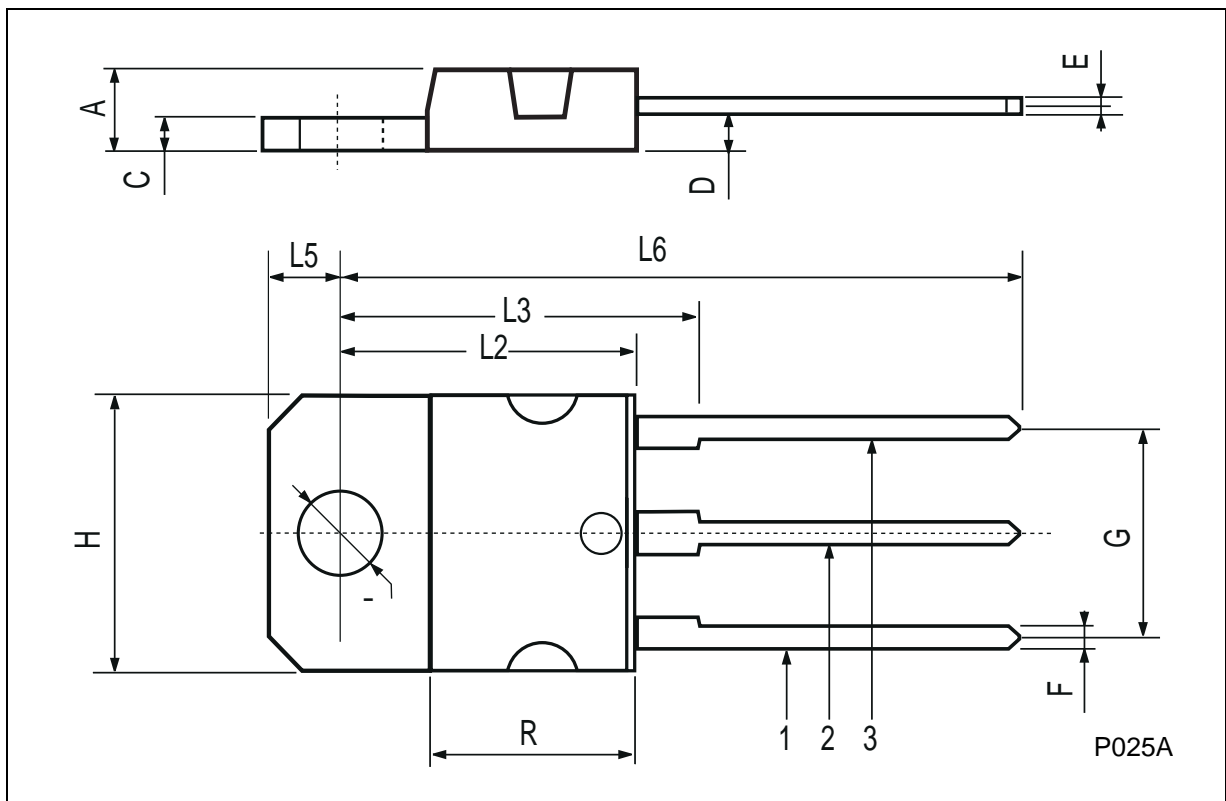


Storage Time Versus Pulse Time.



TO-218 (SOT-93) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.7		4.9	0.185		0.193
C	1.17		1.37	0.046		0.054
D		2.5			0.098	
E	0.5		0.78	0.019		0.030
F	1.1		1.3	0.043		0.051
G	10.8		11.1	0.425		0.437
H	14.7		15.2	0.578		0.598
L2	-		16.2	-		0.637
L3		18			0.708	
L5	3.95		4.15	0.155		0.163
L6		31			1.220	
R	-		12.2	-		0.480
Ø	4		4.1	0.157		0.161



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