



BUF410

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

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

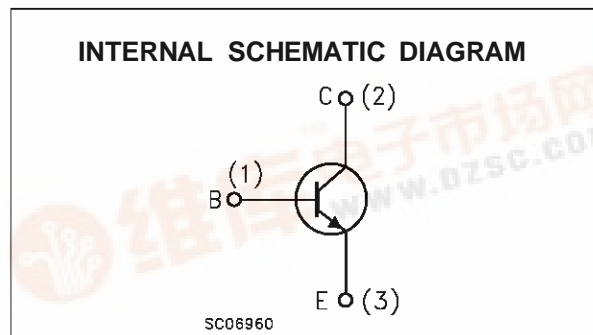
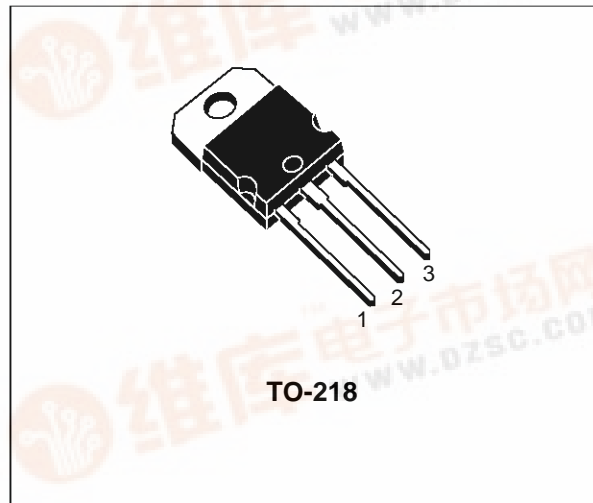
APPLICATIONS:

- SWITCH MODE POWER SUPPLIES
- MOTOR CONTROL

DESCRIPTION

The BUF410 is manufactured using High Voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capacity. They use 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 ($V_{BE} = -1.5\text{ V}$)	850	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 ($t_p < 5\text{ ms}$)	30	A
I_B	Base Current	3	A
I_{BM}	Base Peak Current ($t_p < 5\text{ ms}$)	4.5	A
P_{tot}	Total Dissipation at $T_c = 25\text{ }^\circ\text{C}$	125	W
T_{stg}	Storage Temperature	-65 to 150	$^\circ\text{C}$
T_j	Max Operation Junction Temperature	150	$^\circ\text{C}$
T_j	Max. Operating Junction Temperature	150	$^\circ\text{C}$

BUF410

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-Case	Max	1	$^{\circ}\text{C}/\text{W}$
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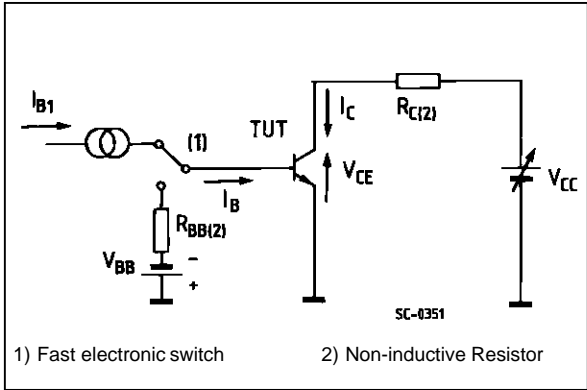
ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CER}	Collector Cut-off Current ($R_{BE} = 100 \Omega$)	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV} \quad T_c = 100^{\circ}\text{C}$			0.2 1	mA mA
I_{CEV}	Collector Cut-off Current ($I_B = 0$)	$V_{CE} = V_{CEV} \quad V_{BE} = -1.5 \text{ V}$ $V_{CE} = V_{CEV} \quad V_{BE} = -1.5 \text{ V} \quad T_c = 100^{\circ}\text{C}$			0.2 1	mA mA
I_{EBO}	Emitter Cut-off Current ($I_C = 0$)	$V_{BE} = 5 \text{ V}$			1	mA
$V_{CEO(sus)}^*$	Collector-Emitter Sustaining Voltage	$I_C = 200 \text{ mA} \quad L = 25 \text{ mH}$	450			V
V_{EBO}	Emitter Base Voltage ($I_C = 0$)	$I_E = 50 \text{ mA}$	7			V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 5 \text{ A} \quad I_B = 0.5 \text{ A}$ $I_C = 5 \text{ A} \quad I_B = 0.5 \text{ A} \quad T_c = 100^{\circ}\text{C}$ $I_C = 10 \text{ A} \quad I_B = 2 \text{ A}$ $I_C = 10 \text{ A} \quad I_B = 2 \text{ A} \quad T_c = 100^{\circ}\text{C}$		0.8 0.5	2.8 2	V V V V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 5 \text{ A} \quad I_B = 0.5 \text{ A}$ $I_C = 5 \text{ A} \quad I_B = 0.5 \text{ A} \quad T_c = 100^{\circ}\text{C}$ $I_C = 10 \text{ A} \quad I_B = 2 \text{ A}$ $I_C = 10 \text{ A} \quad I_B = 2 \text{ A} \quad T_c = 100^{\circ}\text{C}$		0.9 1.1	1.5 1.5	V V V V
di_c/dt	Rate of rise on-state Collector Current	$V_{CC} = 300 \text{ V} \quad R_C = 0 \quad t_p = 3 \mu\text{s}$ $I_{B1} = 0.75 \text{ A} \quad T_j = 25^{\circ}\text{C}$ $I_{B1} = 0.75 \text{ A} \quad T_j = 100^{\circ}\text{C}$ $I_{B1} = 3 \text{ A} \quad T_j = 100^{\circ}\text{C}$	45 100	60		$\text{A}/\mu\text{s}$ $\text{A}/\mu\text{s}$ $\text{A}/\mu\text{s}$
$V_{CE(3\mu\text{s})}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 \text{ V} \quad R_C = 60 \Omega$ $I_{B1} = 0.75 \text{ A} \quad T_j = 25^{\circ}\text{C}$ $I_{B1} = 0.75 \text{ A} \quad T_j = 100^{\circ}\text{C}$		2.1	8	V V
$V_{CE(5\mu\text{s})}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 \text{ V} \quad R_C = 60 \Omega$ $I_{B1} = 0.75 \text{ A} \quad T_j = 25^{\circ}\text{C}$ $I_{B1} = 0.75 \text{ A} \quad T_j = 100^{\circ}\text{C}$		1.1	4	V V
t_s t_f t_c	Storage Time Fall Time Cross Over Time	$I_C = 5 \text{ A} \quad V_{CC} = 50 \text{ V}$ $V_{BB} = -5 \text{ V} \quad R_{BB} = 1.2 \Omega$ $V_{clamp} = 400 \text{ V} \quad I_{B1} = 0.5 \text{ A}$ $L = 0.5 \text{ mH}$		0.8 0.05 0.08		μs μs μs
t_s t_f t_c	Storage Time Fall Time Cross Over Time	$I_C = 5 \text{ A} \quad V_{CC} = 50 \text{ V}$ $V_{BB} = -5 \text{ V} \quad R_{BB} = 1.2 \Omega$ $V_{clamp} = 400 \text{ V} \quad I_{B1} = 0.5 \text{ A}$ $L = 0.5 \text{ mH} \quad T_j = 100^{\circ}\text{C}$			1.8 0.1 0.18	μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	$I_C = 5 \text{ A} \quad V_{CC} = 50 \text{ V}$ $V_{BB} = -5 \text{ V} \quad R_{BB} = 1.2 \Omega$ $V_{clamp} = 400 \text{ V} \quad I_{B1} = 0.5 \text{ A}$ $L = 0.5 \text{ mH} \quad T_j = 125^{\circ}\text{C}$	500			V
t_s t_f t_c	Storage Time Fall Time Cross Over Time	$I_C = 5 \text{ A} \quad V_{CC} = 50 \text{ V}$ $V_{BB} = 0 \quad R_{BB} = 0.3 \Omega$ $V_{clamp} = 400 \text{ V} \quad I_{B1} = 0.5 \text{ A}$ $L = 0.5 \text{ mH}$		1.5 0.04 0.07		μs μs μs

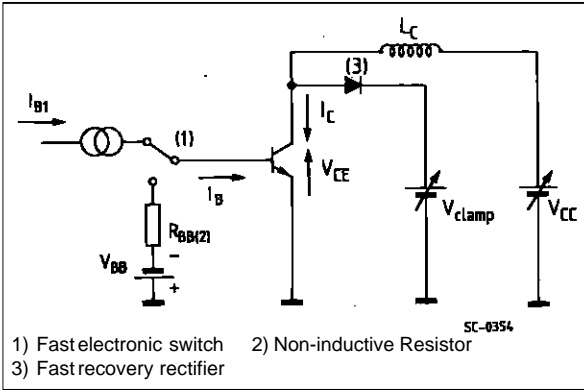
ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t_s t_f t_c	Storage Time Fall Time Cross Over Time	$I_C = 5\text{ A}$ $V_{BB} = 0$ $V_{clamp} = 400\text{ V}$ $L = 0.5\text{ mH}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 0.3\ \Omega$ $I_{B1} = 0.5\text{ A}$ $T_J = 100^\circ\text{C}$			3 0.15 0.25	μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	$I_C = 5\text{ A}$ $V_{BB} = 0$ $V_{clamp} = 400\text{ V}$ $L = 0.5\text{ mH}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 0.3\ \Omega$ $I_{B1} = 0.5\text{ A}$ $T_J = 125^\circ\text{C}$	500			V
t_s t_f t_c	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	Storage Time Fall Time Cross Over Time	$I_C = 10\text{ A}$ $V_{BB} = -5\text{ V}$ $V_{clamp} = 400\text{ V}$ $L = 0.25\text{ mH}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 1.2\ \Omega$ $I_{B1} = 2\text{ A}$ $T_J = 100^\circ\text{C}$			3.2 0.12 0.3	μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	$I_{C\text{Woff}} = 15\text{ A}$ $V_{BB} = -5\text{ V}$ $L = 0.17\text{ mH}$ $T_J = 125^\circ\text{C}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 1.2\ \Omega$ $I_{B1} = 3\text{ A}$	400			V

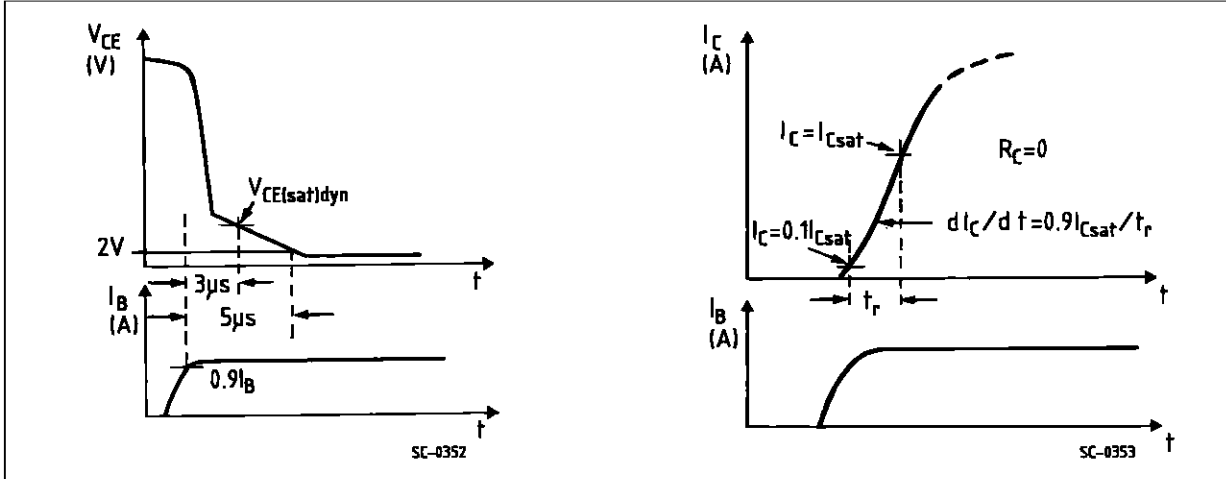
Turn-on Switching Test Circuit



Turn-off Switching Test Circuit

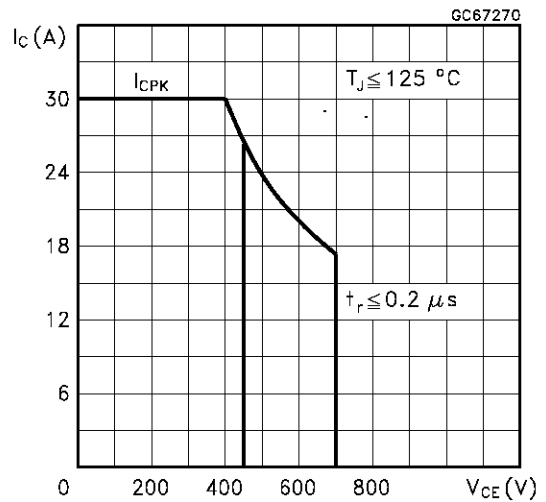
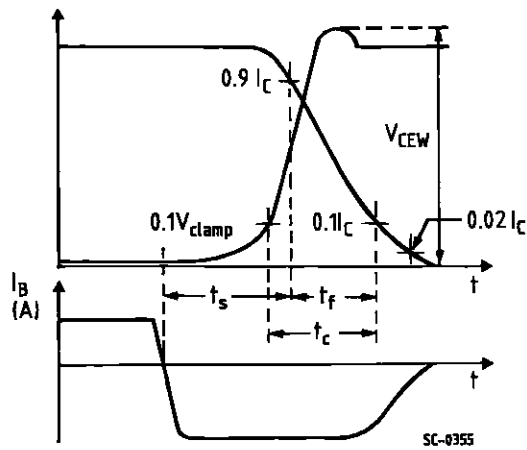


Turn-on Switching Test Waveforms.



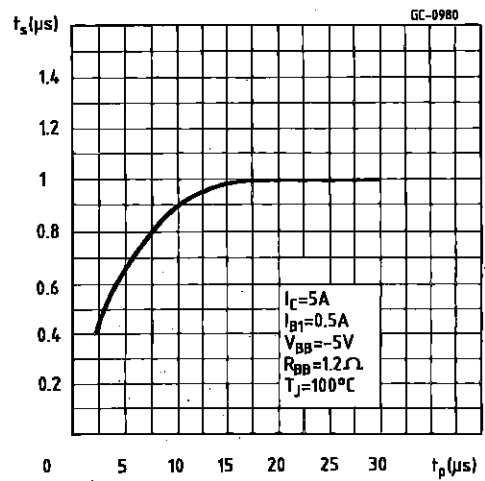
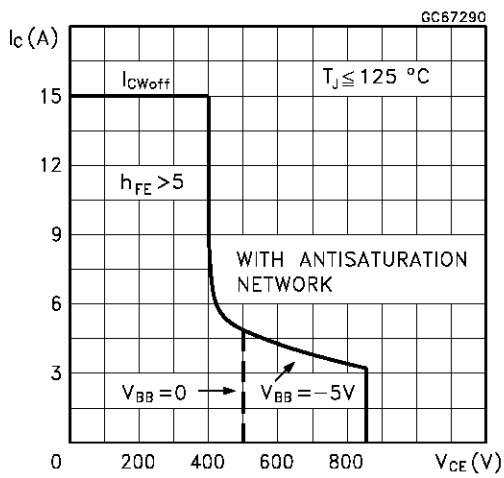
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Turn-off Switching Test Waveforms (inductive load). Forward Biased Safe Operating Areas.



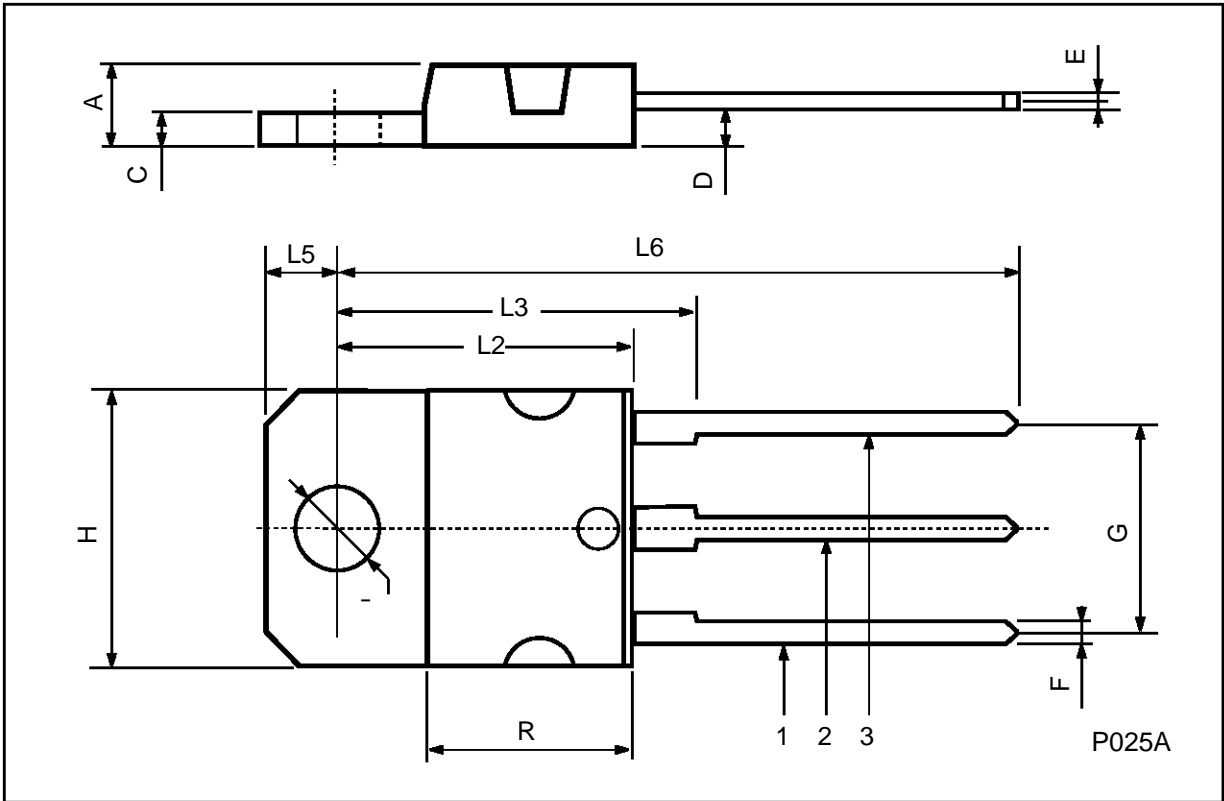
Reverse Biased Safe Operating Area

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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