



BUF420A

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

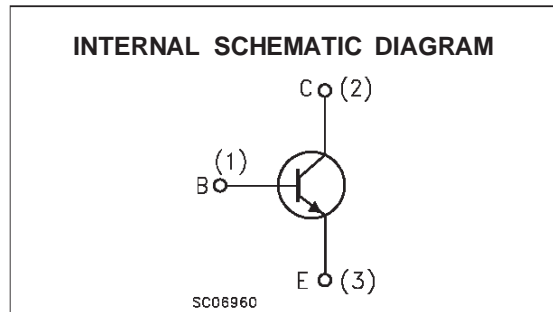
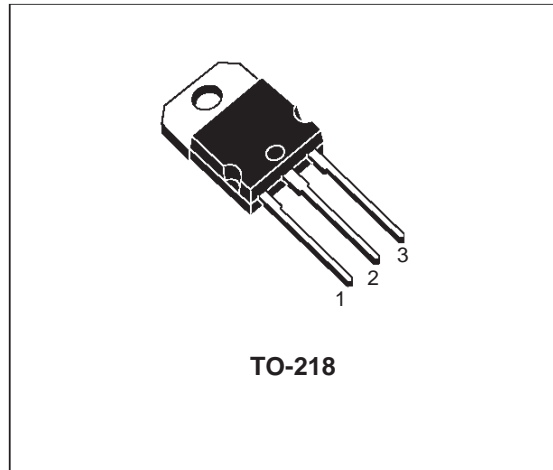
APPLICATIONS:

- SWITCH MODE POWER SUPPLIES
- MOTOR CONTROL

DESCRIPTION

The BUF420A is manufactured using High Voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capacity. It 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 ($V_{BE} = -1.5V$)	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	30	A
I_{CM}	Collector Peak Current ($t_p < 5$ ms)	60	A
I_B	Base Current	6	A
I_{BM}	Base Peak Current ($t_p < 5$ ms)	9	A
P_{tot}	Total Dissipation at $T_c = 25$ °C	200	W
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

BUF420A

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-Case	Max	0.63	°C/W
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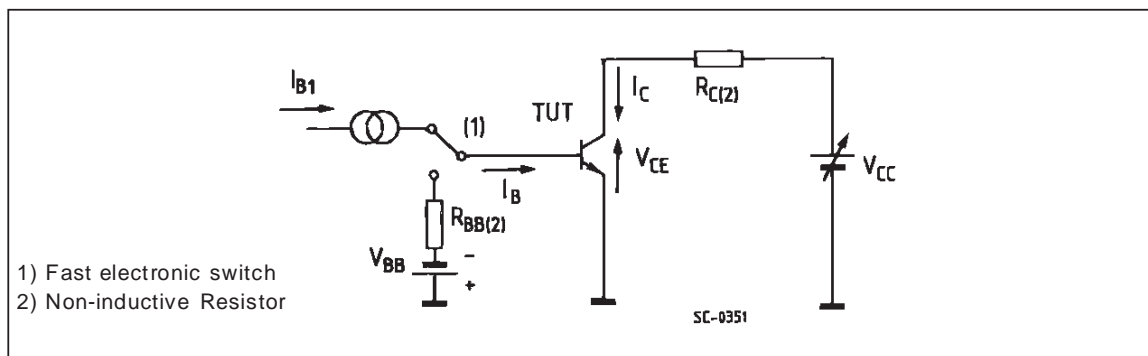
ELECTRICAL CHARACTERISTICS ($T_{case} = 25\text{ °C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CER}	Collector Cut-off Current ($R_{BE} = 5\ \Omega$)	$V_{CE} = 1000\text{ V}$ $V_{CE} = 1000\text{ V}$ $T_c = 100\text{ °C}$			0.2 1	mA mA
I_{CEV}	Collector Cut-off Current ($V_{BE} = -1.5\text{ V}$)	$V_{CE} = 1000\text{ V}$ $V_{CE} = 1000\text{ V}$ $T_c = 100\text{ °C}$			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 ($I_B = 0$)	$I_c = 200\text{ mA}$ $L = 25\text{ mH}$	450			V
V_{EBO}	Emitter Base Voltage ($I_c = 0$)	$I_E = 50\text{ mA}$	7			V
$V_{CE(sat)*}$	Collector-Emitter Saturation Voltage	$I_c = 10\text{ A}$ $I_B = 1\text{ A}$ $I_c = 10\text{ A}$ $I_B = 1\text{ A}$ $T_c = 100\text{ °C}$ $I_c = 20\text{ A}$ $I_B = 2\text{ A}$ $I_c = 20\text{ A}$ $I_B = 2\text{ A}$ $T_c = 100\text{ °C}$		0.8 0.5	2.8 2	V V V V
$V_{BE(sat)*}$	Base-Emitter Saturation Voltage	$I_c = 10\text{ A}$ $I_B = 1\text{ A}$ $I_c = 10\text{ A}$ $I_B = 1\text{ A}$ $T_c = 100\text{ °C}$ $I_c = 20\text{ A}$ $I_B = 2\text{ A}$ $I_c = 20\text{ A}$ $I_B = 2\text{ A}$ $T_c = 100\text{ °C}$		0.9 1.1	1.5 1.5	V V V V
di_c/dt	Rate of rise on-state Collector Current	$V_{CC} = 300\text{ V}$ $R_C = 0$ $t_p = 3\ \mu\text{s}$ $I_{B1} = 1.5\text{ A}$ $T_j = 25\text{ °C}$ $I_{B1} = 1.5\text{ A}$ $T_j = 100\text{ °C}$ $I_{B1} = 6\text{ A}$ $T_j = 100\text{ °C}$	70 150	100		A/ μs A/ μs A/ μs
$V_{CE(3\mu\text{s})}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300\text{ V}$ $R_C = 60\ \Omega$ $I_{B1} = 1.5\text{ A}$ $T_j = 25\text{ °C}$ $I_{B1} = 1.5\text{ A}$ $T_j = 100\text{ °C}$		2.1	8	V V
$V_{CE(5\mu\text{s})}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300\text{ V}$ $R_C = 60\ \Omega$ $I_{B1} = 1.5\text{ A}$ $T_j = 25\text{ °C}$ $I_{B1} = 1.5\text{ A}$ $T_j = 100\text{ °C}$		1.1	4	V V
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_c = 10\text{ A}$ $V_{CC} = 50\text{ V}$ $V_{BB} = -5\text{ V}$ $R_{BB} = 0.6\ \Omega$ $V_{clamp} = 400\text{ V}$ $I_{B1} = 0.5\text{ A}$ $L = 0.25\text{ mH}$		1 0.05 0.08		μs μs μs
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_c = 10\text{ A}$ $V_{CC} = 50\text{ V}$ $V_{BB} = -5\text{ V}$ $R_{BB} = 0.6\ \Omega$ $V_{clamp} = 400\text{ V}$ $I_{B1} = 1\text{ A}$ $L = 0.25\text{ mH}$ $T_j = 100\text{ °C}$			2 0.1 0.18	μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	$I_c = 10\text{ A}$ $V_{CC} = 50\text{ V}$ $V_{BB} = -5\text{ V}$ $R_{BB} = 0.6\ \Omega$ $V_{clamp} = 400\text{ V}$ $I_{B1} = 1\text{ A}$ $L = 0.25\text{ mH}$ $T_j = 125\text{ °C}$	500			V
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_c = 10\text{ A}$ $V_{CC} = 50\text{ V}$ $V_{BB} = 0$ $R_{BB} = 0.15\ \Omega$ $V_{clamp} = 400\text{ V}$ $I_{B1} = 1\text{ A}$ $L = 0.25\text{ mH}$		1.5 0.04 0.07		μs μs μs

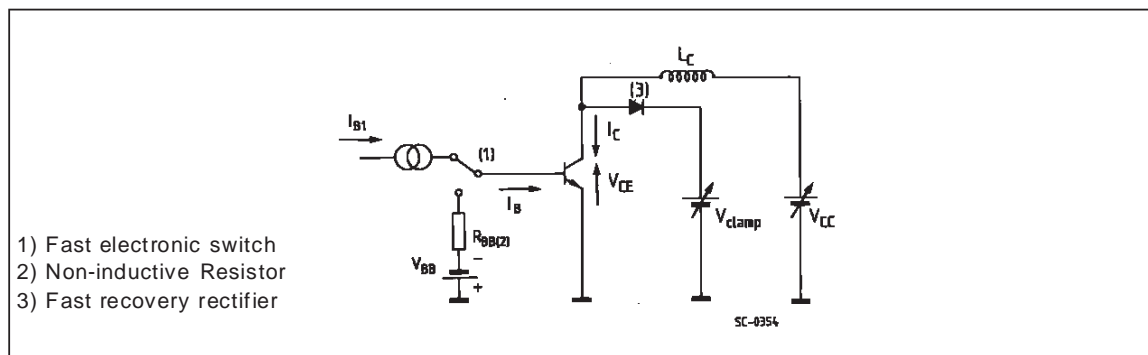
ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t_s	INDUCTIVE LOAD Storage Time	$I_C = 10\text{ A}$	$V_{CC} = 50\text{ V}$			3	μs
t_f	Fall Time	$V_{BB} = 0$	$R_{BB} = 0.15\ \Omega$			0.15	μs
t_c	Cross Over Time	$V_{clamp} = 400\text{ V}$	$I_{B1} = 1\text{ A}$			0.25	μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	$L = 0.25\text{ mH}$	$T_j = 100^\circ\text{C}$	500			V
t_s	INDUCTIVE LOAD Storage Time	$I_C = 20\text{ A}$	$V_{CC} = 50\text{ V}$		2.2		μs
t_f	Fall Time	$V_{BB} = -5\text{ V}$	$R_{BB} = 0.6\ \Omega$		0.06		μs
t_c	Cross Over Time	$V_{clamp} = 400\text{ V}$	$I_{B1} = 4\text{ A}$		0.12		μs
t_s	INDUCTIVE LOAD Storage Time	$I_C = 20\text{ A}$	$V_{CC} = 50\text{ V}$			3.5	μs
t_f	Fall Time	$V_{BB} = -5\text{ V}$	$R_{BB} = 0.6\ \Omega$			0.12	μs
t_c	Cross Over Time	$V_{clamp} = 400\text{ V}$	$I_{B1} = 4\text{ A}$			0.3	μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	$L = 0.12\text{ mH}$	$T_j = 125^\circ\text{C}$	400			V
		$I_{C\text{Woff}} = 30\text{ A}$	$V_{CC} = 50\text{ V}$				
		$V_{BB} = -5\text{ V}$	$R_{BB} = 0.6\ \Omega$				
		$L = 0.08\text{ mH}$	$I_{B1} = 6\text{ A}$				
		$T_j = 125^\circ\text{C}$					

Turn-on Switching Test Circuit.

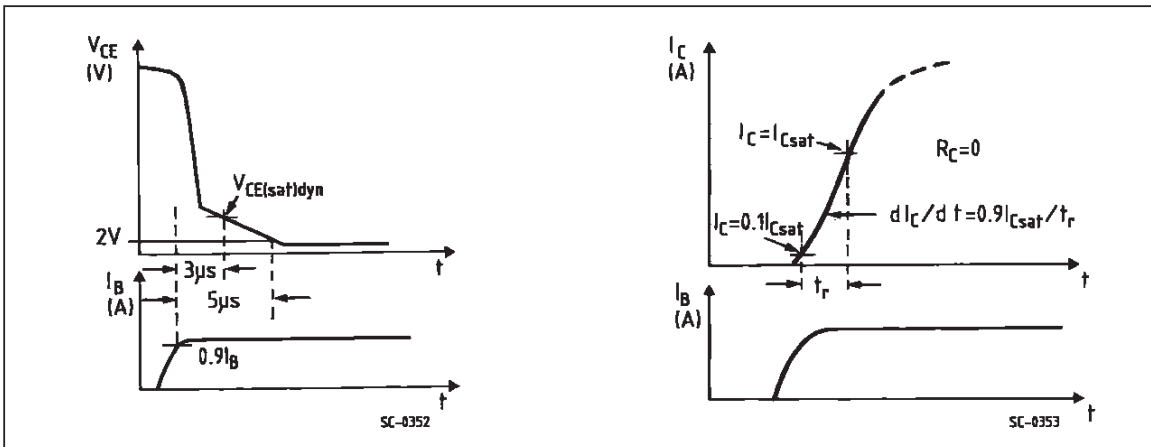


Turn-off Switching Test Circuit.

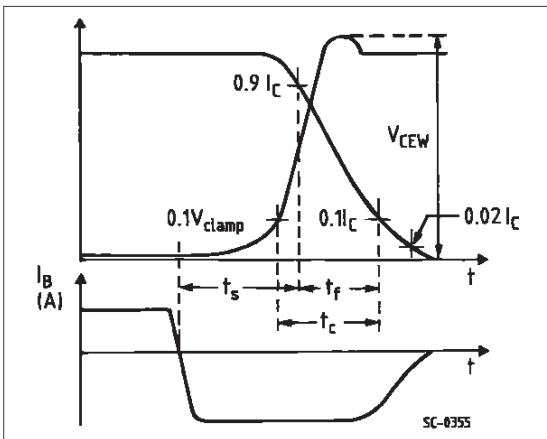


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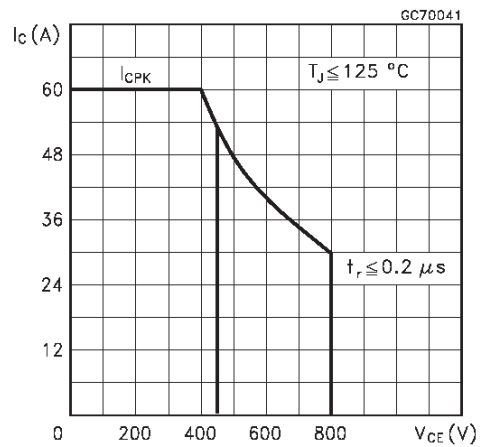
Turn-on Switching Test Waveforms.



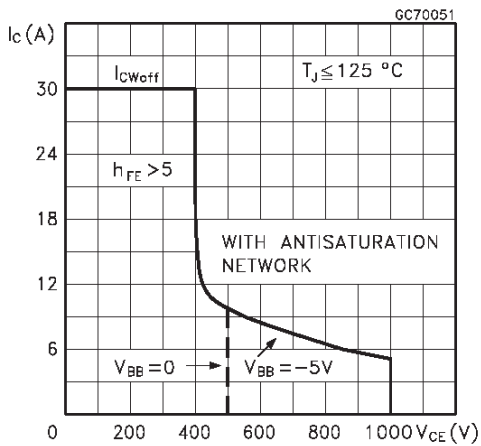
Turn-off Switching Test Waveforms (inductive load).



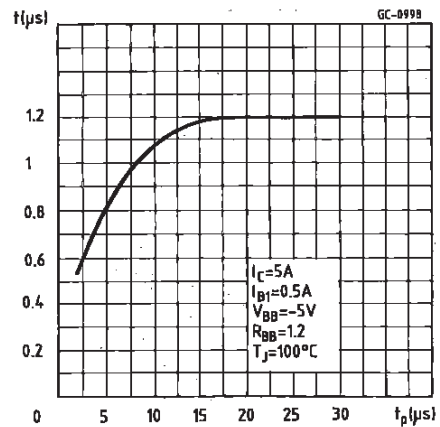
Forward Biased Safe Operating Areas.



Reverse Biased Safe Operating Area

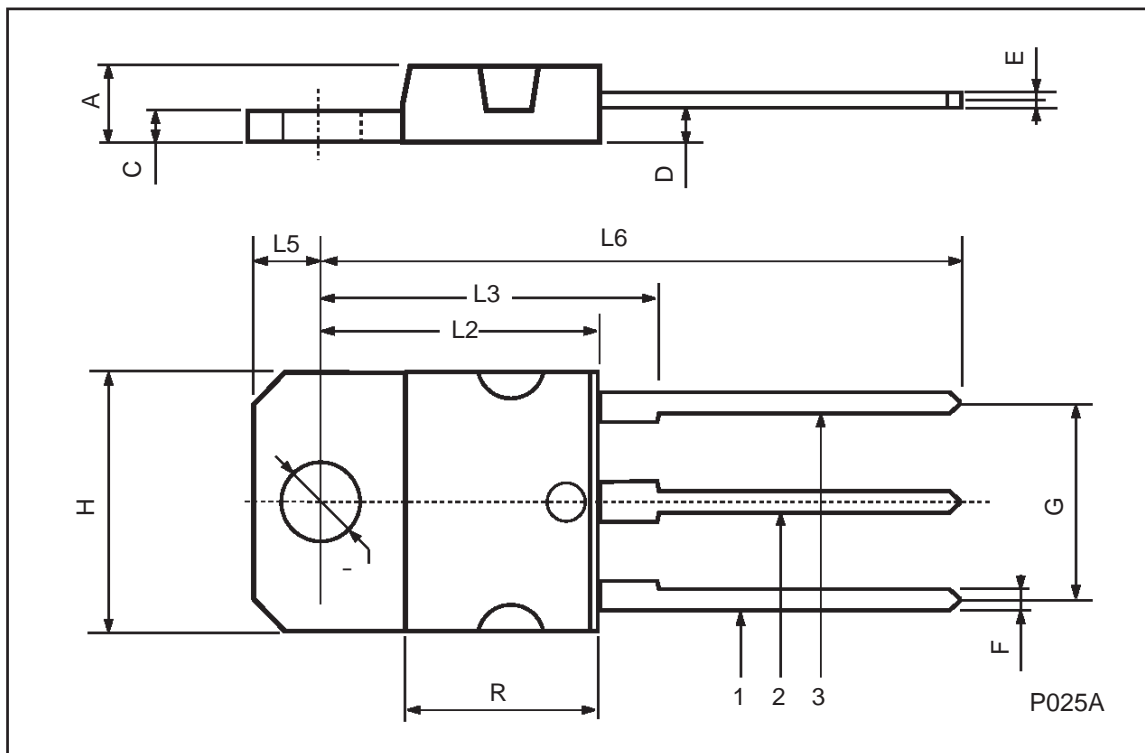


Storage Time Versus Pulse Time.



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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