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BUF420AW

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

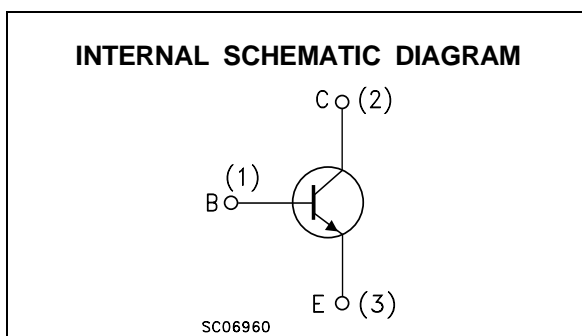
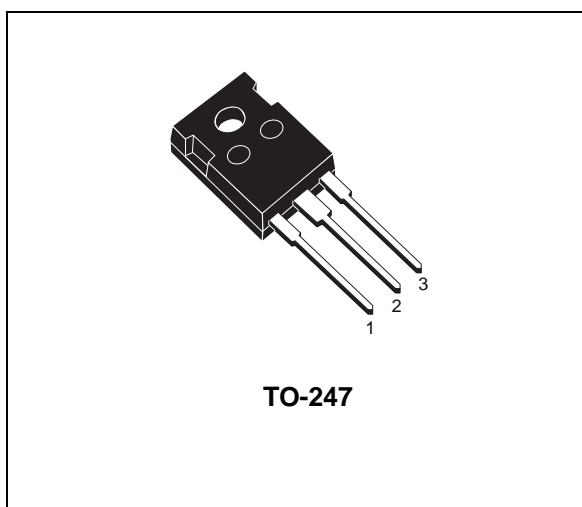
APPLICATIONS:

- SWITCH MODE POWER SUPPLIES
- MOTOR CONTROL

DESCRIPTION

The BUF420AW 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 ($V_{BE} = -1.5V$)	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

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THERMAL DATA

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

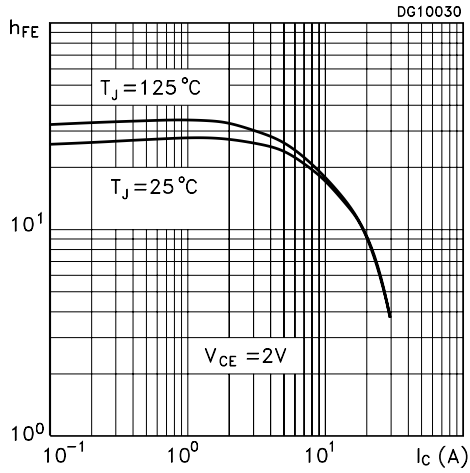
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _{CER}	Collector Cut-off Current (R _{BE} = 5 Ω)	V _{CE} = 1000 V V _{CE} = 1000 V T _C = 100 °C			0.2 1	mA mA
I _{CEV}	Collector Cut-off Current (V _{BE} = -1.5V)	V _{CE} = 1000 V V _{CE} = 1000 V T _C = 100 °C			0.2 1	mA mA
I _{EBO}	Emitter Cut-off 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 = 10 A I _B = 1 A I _C = 10 A I _B = 1 A T _C = 100°C I _C = 20 A I _B = 4 A I _C = 20 A I _B = 4 A T _C = 100°C		0.8 0.5	2.8 2	V V V V
V _{BE(sat)*}	Base-Emitter Saturation Voltage	I _C = 10 A I _B = 1 A I _C = 10 A I _B = 1 A T _C = 100°C I _C = 20 A I _B = 4 A I _C = 20 A I _B = 4 A T _C = 100°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 V R _C = 0 t _p = 3 μs I _{B1} = 1.5 A T _C = 25°C I _{B1} = 1.5 A T _C = 100°C I _{B1} = 6 A T _C = 100°C	70 150	100		A/μs A/μs A/μs
V _{CE(3μs)}	Collector-Emitter Dynamic Voltage	V _{CC} = 300 V R _C = 60 Ω I _{B1} = 1.5 A T _C = 25°C I _{B1} = 1.5 A T _C = 100°C		2.1	8	V V
V _{CE(5μs)}	Collector-Emitter Dynamic Voltage	V _{CC} = 300 V R _C = 60 Ω I _{B1} = 1.5 A T _C = 25°C I _{B1} = 1.5 A T _C = 100°C		1.1	4	V V
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	I _C = 10 A V _{CC} = 50 V V _{BB} = - 5 V R _{BB} = 0.6 Ω V _{clamp} = 400 V I _{B1} = 1 A L = 0.25 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 A V _{CC} = 50 V V _{BB} = - 5 V R _{BB} = 0.6 Ω V _{clamp} = 400 V I _{B1} = 1 A L = 0.25 mH T _C = 100°C			2 0.1 0.18	μs μs μs
V _{CEW}	Maximum Collector Emitter Voltage without Snubber	I _C = 10 A V _{CC} = 50 V V _{BB} = - 5 V R _{BB} = 0.6 Ω I _{B1} = 1 A L = 0.25 mH T _C = 125°C	500			V
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	I _C = 10 A V _{CC} = 50 V V _{BB} = 0 R _{BB} = 0.15 Ω V _{clamp} = 400 V I _{B1} = 1 A L = 0.25 mH		1.5 0.04 0.07		μs μs μs

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ELECTRICAL CHARACTERISTICS (continued)

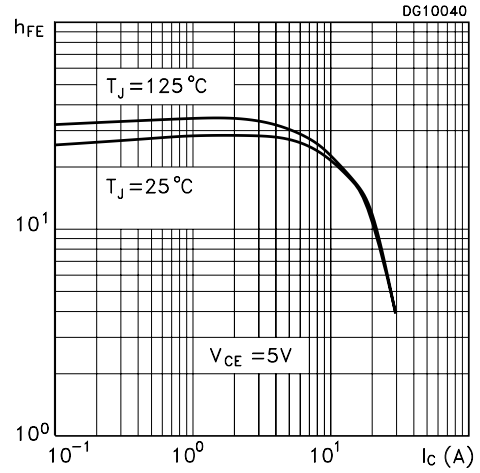
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_C = 10\text{ A}$ $V_{BB} = 0$ $V_{clamp} = 400\text{ V}$ $L = 0.25\text{ mH}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 0.15\ \Omega$ $I_{B1} = 1\text{ A}$ $T_C = 100^\circ\text{C}$			3 0.15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

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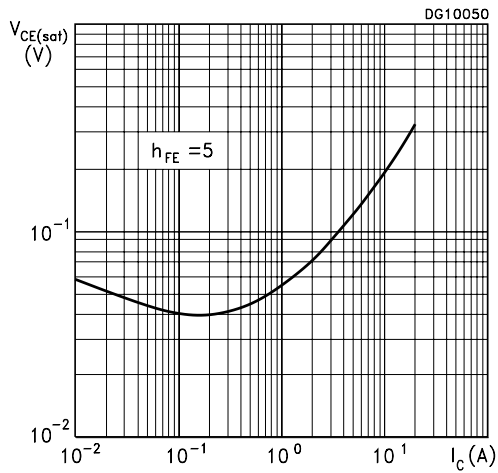
DC Current Gain



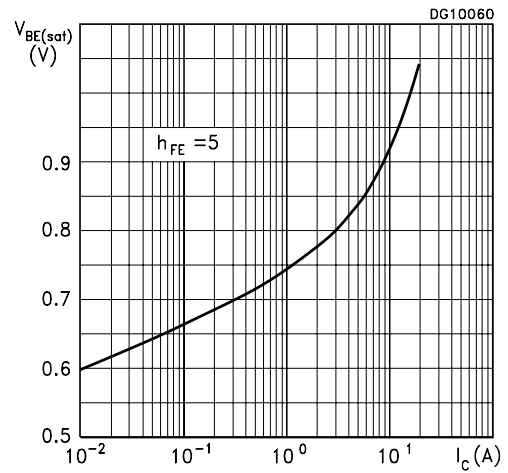
DC Current Gain



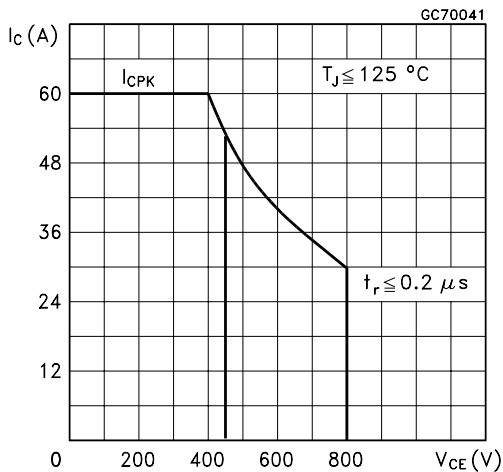
Collector Emitter Saturation Voltage



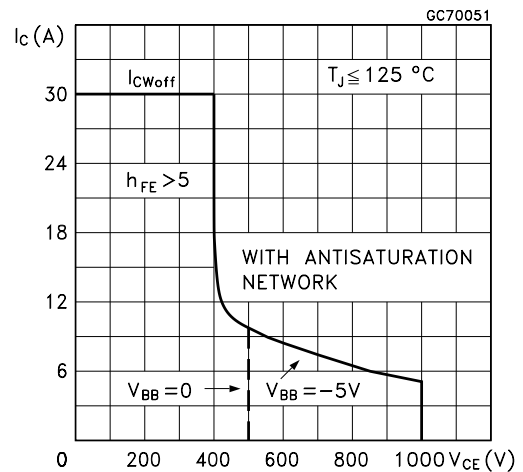
Base Emitter Saturation Voltage



Forward Biased Safe Operating Area



Reverse Biased Safe Operating Area



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Storage Time Versus Pulse Time.

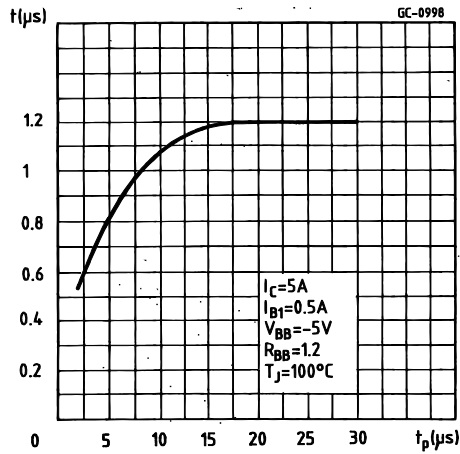
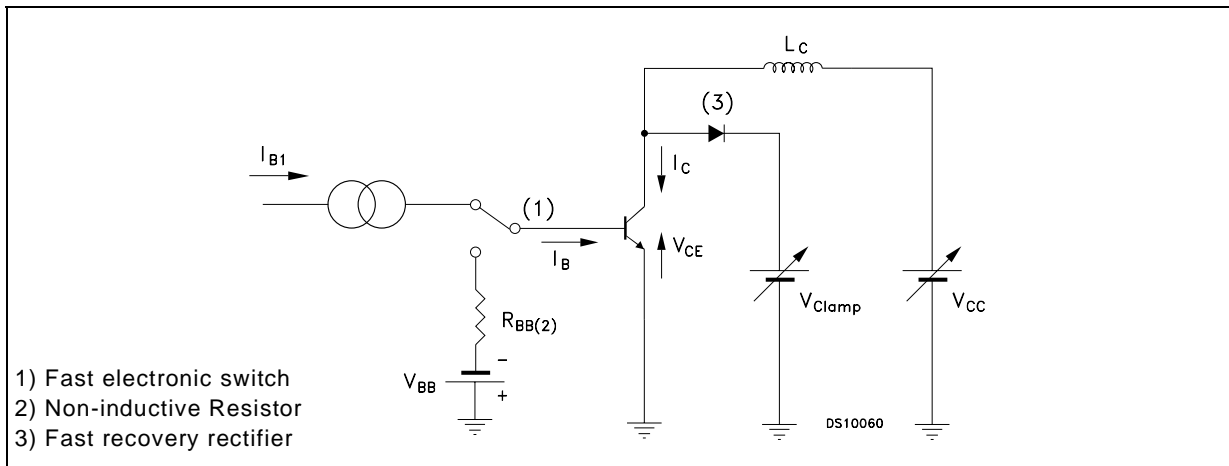
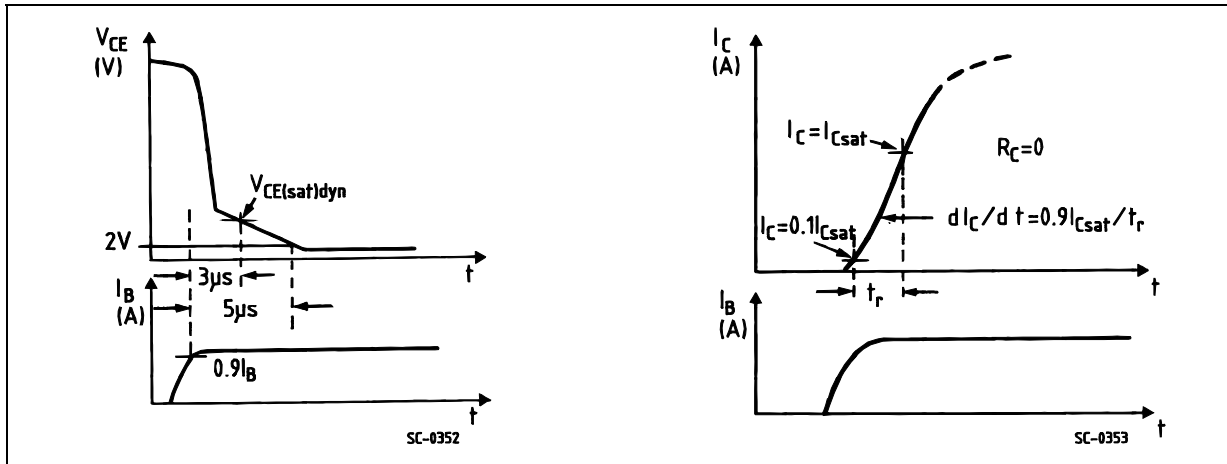


Figure 1: Inductive Load Switching Test Circuit.

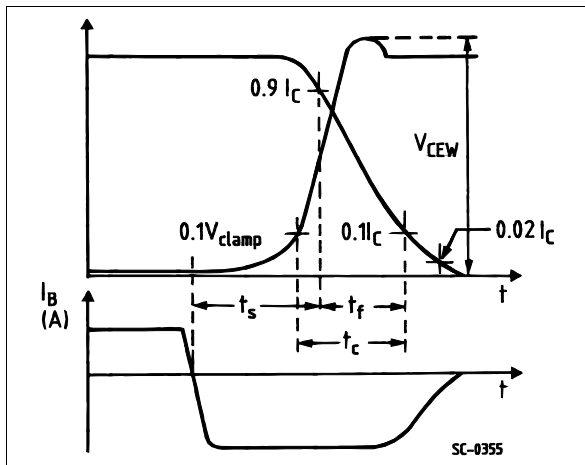


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Turn-on Switching Test Waveforms.



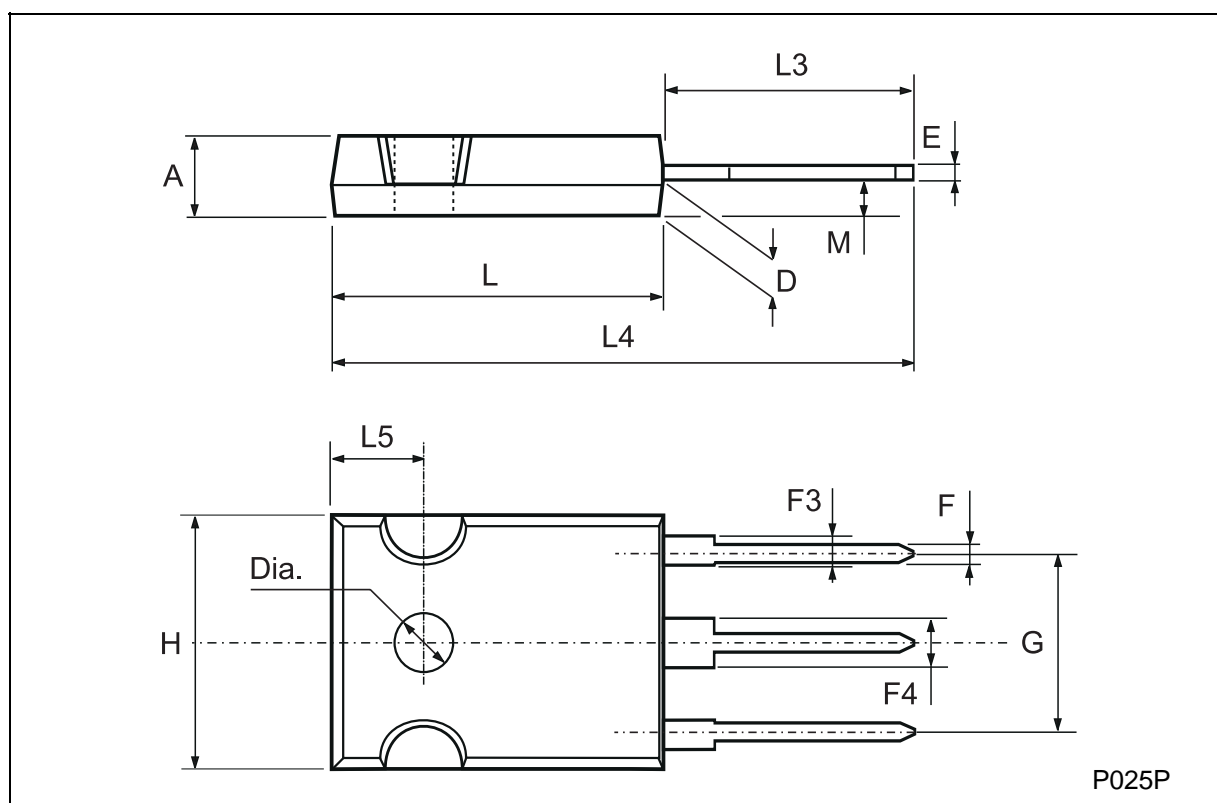
Turn-off Switching Test Waveforms
(inductive load).



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TO-247 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.7		5.3	0.185		0.209
D	2.2		2.6	0.087		0.102
E	0.4		0.8	0.016		0.031
F	1		1.4	0.039		0.055
F3	2		2.4	0.079		0.094
F4	3		3.4	0.118		0.134
G		10.9			0.429	
H	15.3		15.9	0.602		0.626
L	19.7		20.3	0.776		0.779
L3	14.2		14.8	0.559		0.582
L4		34.6			1.362	
L5		5.5			0.217	
M	2		3	0.079		0.118



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