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

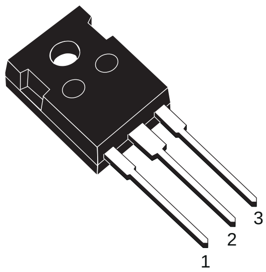
APPLICATIONS:

- SWITCH MODE POWER SUPPLIES
- MOTOR CONTROL

DESCRIPTION

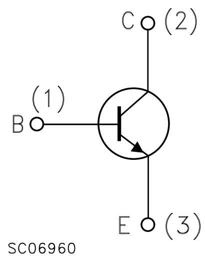
The BUF420AW is manufactured using High Voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capacity. It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA.

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



TO-247

INTERNAL SCHEMATIC DIAGRAM



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 ^oC	200	W
T_{stg}	Storage Temperature	-65 to 150	^oC
T_j	Max. Operating Junction Temperature	150	^oC

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-Case	Max	0.63	$^oC/W$

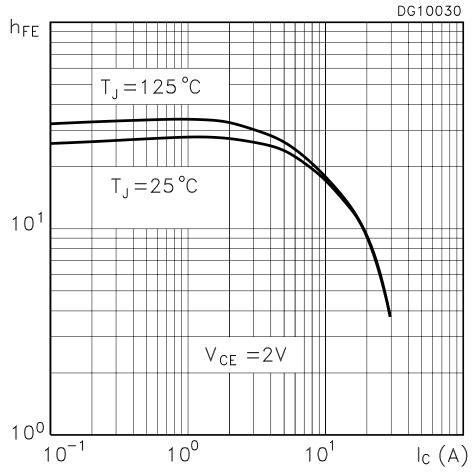
ELECTRICAL CHARACTERISTICS (T_{case} = 25 ^oC unless otherwise specified)

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 ^oC			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 ^oC			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 = 10A I_B = 1 A I_C = 10 A I_B = 1 A T_C =100^oC I_C = 20 A I_B = 4 A I_C = 20 A I_B = 4 A T_C =100^oC		0.8 0.5 	 2.8 2	V V V V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 10A I_B = 1 A I_C = 10 A I_B = 1 A T_C =100^oC I_C = 20 A I_B = 4 A I_C = 20 A I_B = 4 A T_C =100^oC		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^oC I_{B1} = 1.5 A T_C =100^oC I_{B1} = 6 A T_C =100^oC	 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^oC I_{B1} = 1.5 A T_C =100^oC		 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^oC I_{B1} = 1.5 A T_C =100^oC		 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^oC			 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^oC	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

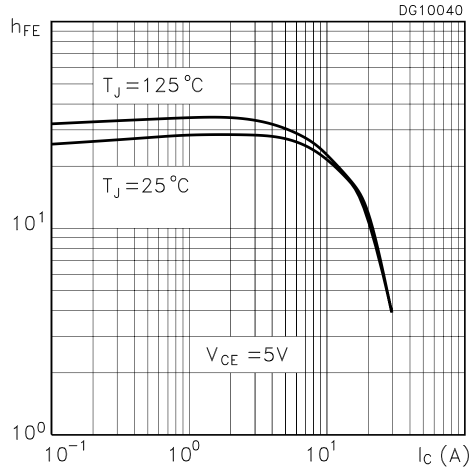
ELECTRICAL CHARACTERISTICS (continued)

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 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 T_C =100°C			 3 0.15 0.25	 μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	I_C = 10 A V_{CC} = 50 V V_{BB} = 0 R_{BB} = 0.15 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 = 20 A V_{CC} = 50 V V_{BB} = -5 V R_{BB} =0.6 Ω V_{clamp} = 400 V I_{B1} = 4 A L = 0.12 mH		 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 A V_{CC} = 50 V V_{BB} = - 5 V R_{BB} = 0.6 Ω V_{clamp} = 400 V I_{B1} = 4 A L = 0.12 mH T_C =125°C			 3.5 0.12 0.3	 μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	I_{CWoff} = 30 A V_{CC} = 50 V V_{BB} = - 5 V R_{BB} = 0.6 Ω L = 0.12 mH I_{B1} = 6 A T_C =125°C	400			V

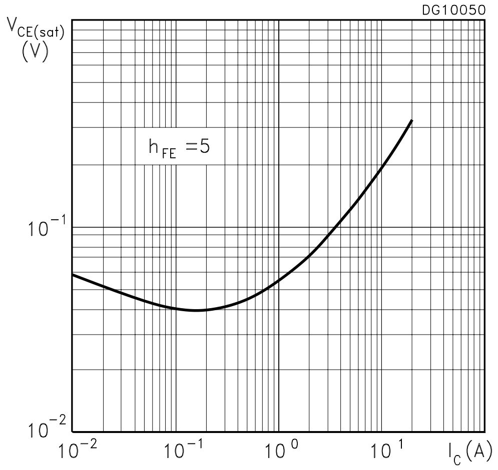
DC Current Gain



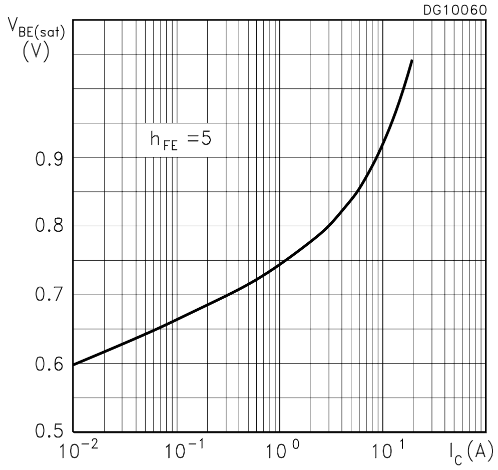
DC Current Gain



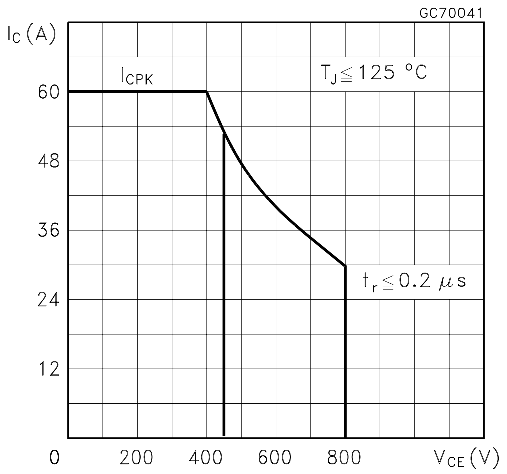
Collector Emitter Saturation Voltage



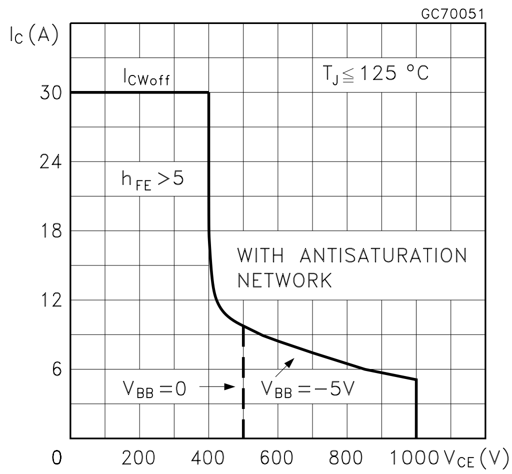
Base Emitter Saturation Voltage



Forward Biased Safe Operating Area



Reverse Biased Safe Operating Area



Storage Time Versus Pulse Time.

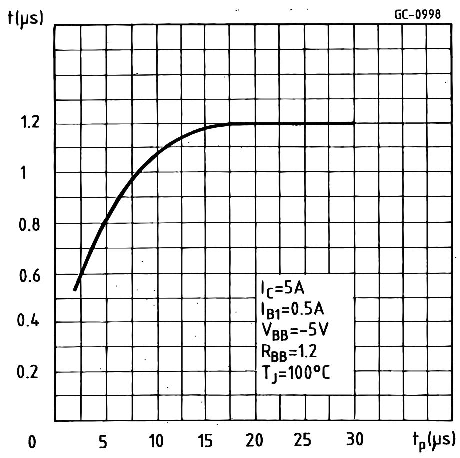
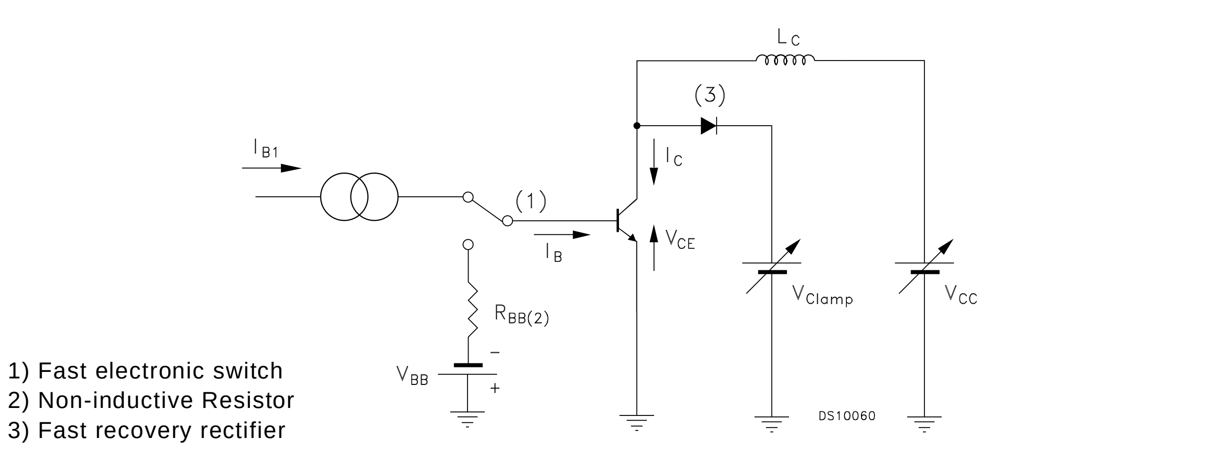
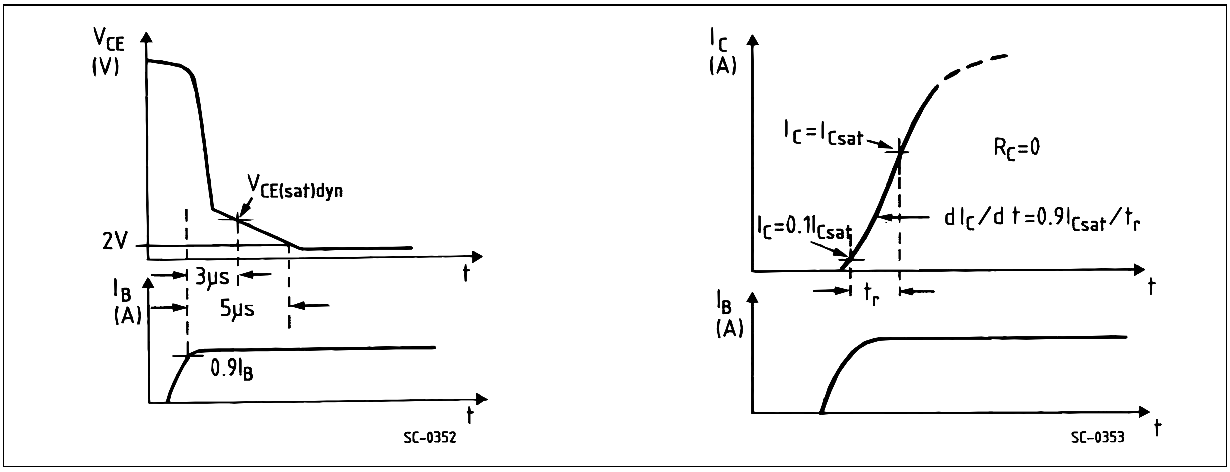


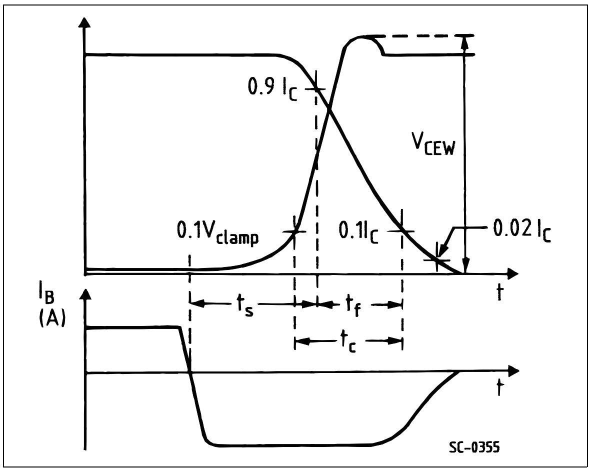
Figure 1: Inductive Load Switching Test Circuit.



Turn-on Switching Test Waveforms.



Turn-off Switching Test Waveforms
(inductive load).



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