

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

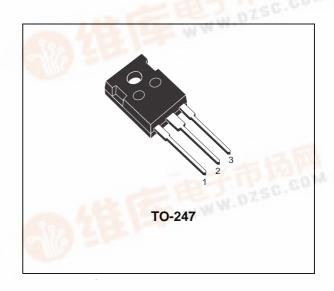
APPLICATIONS:

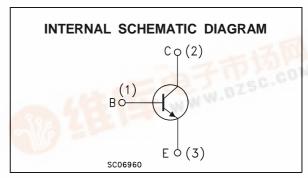
- SWITCH MODE POWER SUPPLIES
- MOTOR CONTROL

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	
Ic	Collector Current	30	Α	
I _{CM}	Collector Peak Current (tp < 5 ms)	60	Α	
Ι _Β	Base Current	6		
I _{BM}	Base Peak Current (t _p < 5 ms)	9	Α	
P _{tot}	Total Dissipation at T _c = 25 °C	200	W	
T _{stg}	Storage Temperature	-65 to 150	°C	
Ti	Max. Operating Junction Temperature	150	°C	



THERMAL DATA

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

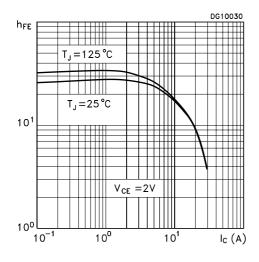
Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
I _{CER}	Collector Cut-off Current ($R_{BE} = 5 \Omega$)	V _{CE} = 1000 V V _{CE} = 1000 V T _C = 100 °C			0.2 1	mA mA
I _{CEV}	Collector Cut-off Current (V _{BE} = -1.5V)	V _{CE} = 1000 V V _{CE} = 1000 V T _C = 100 °C			0.2 1	mA mA
I _{EBO}	Emitter 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			٧
V _{CE(sat)} *	Collector-Emitter Saturation Voltage	$I_C = 10A$ $I_B = 1 A$ $I_C = 100^{\circ}C$		0.8	2.8	V
		$I_C = 20 \text{ A}$ $I_B = 4 \text{ A}$ $I_C = 20 \text{ A}$ $I_B = 4 \text{ A}$ $I_C = 100^{\circ}\text{C}$		0.5	2	V V
V _{BE(sat)} *	Base-Emitter Saturation Voltage	$I_C = 10A$ $I_B = 1 A$ $I_C = 10 A$ $I_B = 1 A$ $T_C = 100^{\circ}C$ $I_C = 20 A$ $I_B = 4 A$		0.9	1.5	> >
		$I_{C} = 20 \text{ A}$ $I_{B} = 4 \text{ A}$ $T_{C} = 100^{\circ}\text{C}$			1.5	V
di _c /dt	Rate of rise on-state Collector Current	$\begin{array}{llllllllllllllllllllllllllllllllllll$	70 150	100		A/μs A/μs A/μs
V _{CE} (3μs)	Collector-Emitter Dynamic Voltage	$\begin{array}{cccccccccccccccccccccccccccccccccccc$		2.1	8	V
V _{CE} (5μs)	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 \text{ V}$ $R_{C} = 60 \Omega$ $I_{B1} = 1.5 \text{ A}$ $T_{C} = 25^{\circ}\text{C}$ $I_{B1} = 1.5 \text{ A}$ $T_{C} = 100^{\circ}\text{C}$		1.1	4	V V
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$\begin{array}{ll} I_{C} = 10 \; A & V_{CC} = 50 \; V \\ V_{BB} = -5 \; V & R_{BB} = 0.6 \; \; \Omega \\ V_{clamp} = 400 \; V & I_{B1} = 1 \; A \\ L = 0.25 \; mH & & \end{array}$		1 0.05 0.08		րջ Ա Ա
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$\begin{array}{lll} I_{C} = 10 \; A & & V_{CC} = 50 \; V \\ V_{BB} = -5 \; V & & R_{BB} = 0.6 \; \Omega \\ V_{clamp} = 400 \; V & & I_{B1} = 1 \; A \\ L = 0.25 \; mH & & T_{C} = 100 \; ^{o}C \end{array}$			2 0.1 0.18	μs μs μs
V _{CEW}	Maximum Collector Emitter Voltage without Snubber	$\begin{array}{lll} I_{C} = 10 \; A & V_{CC} = 50 \; V \\ V_{BB} = -5 \; V & R_{BB} = 0.6 \; \Omega \\ I_{B1} = 1 \; A & L = 0.25 \; mH \\ T_{C} = 125 ^{\circ} C & \end{array}$	500			V
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$\begin{array}{lll} I_{C} = 10 \; A & & V_{CC} = 50 \; V \\ V_{BB} = 0 & & R_{BB} = 0.15 \; \Omega \\ V_{clamp} = 400 \; V & & I_{B1} = 1 \; A \\ L = 0.25 \; mH & & & \end{array}$		1.5 0.04 0.07		μs μs μs

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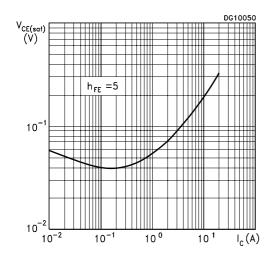
ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Con	Test Conditions		Тур.	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 A V _{BB} = - 5 V V _{clamp} = 400 V L = 0.12 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
VCEW	Maximum Collector Emitter Voltage without Snubber	$I_{CWoff} = 30 \text{ A}$ $V_{BB} = -5 \text{ V}$ $L = 0.12 \text{ mH}$ $T_C = 125^{\circ}\text{C}$	$V_{CC} = 50 \text{ V}$ $R_{BB} = 0.6 \Omega$ $I_{B1} = 6 \text{ A}$	400			V

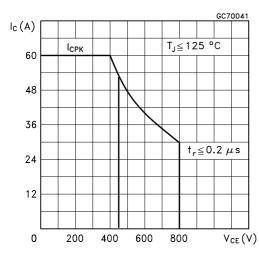
DC Current Gain



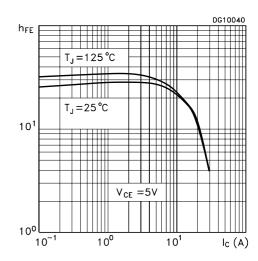
Collector Emitter Saturation Voltage



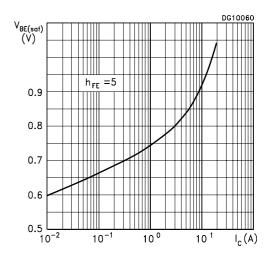
Forward Biased Safe Operating Area



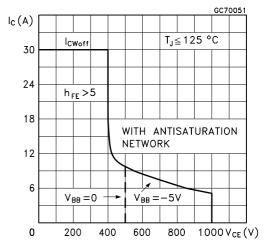
DC Current Gain



Base Emitter Saturation Voltage



Reverse Biased Safe Operating Area



Storage Time Versus Pulse Time.

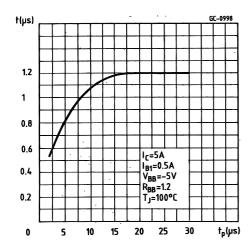
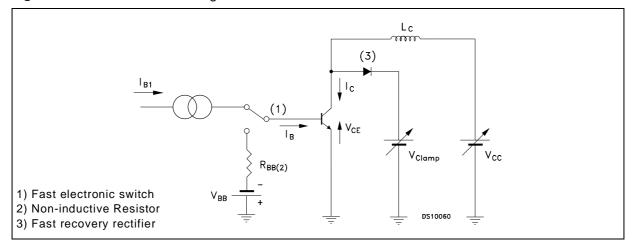
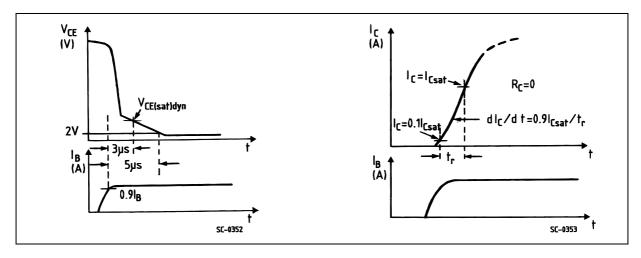


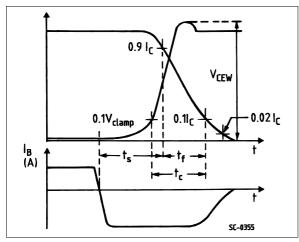
Figure 1: Inductive Load Switching Test Circuit.



Turn-on Switching Test Waveforms.

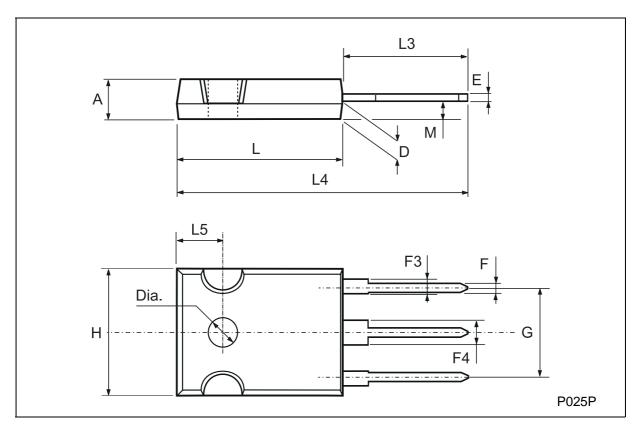


Turn-off Switching Test Waveforms (inductive load).



TO-247 MECHANICAL DATA

DIM.	mm			inch			
D.141.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Α	4.7		5.3	0.185		0.209	
D	2.2		2.6	0.087		0.102	
Е	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		
Н	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		
М	2		3	0.079		0.118	



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