

BUF420M

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

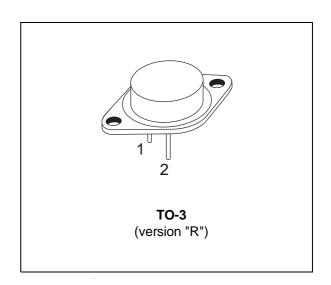
APPLICATIONS:

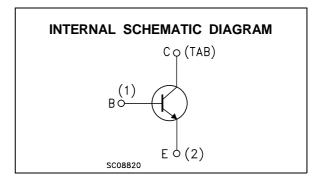
- SWITCH MODE POWER SUPPLIES
- MOTOR CONTROL

DESCRIPTION

The BUF420M 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)	850	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 (t _p < 5 ms)	60	Α
I _B	Base Current	6	Α
I _{BM}	Base Peak Current (t _p < 5 ms)	9	Α
P _{tot}	Total Dissipation at T _c = 25 °C	275	W
T _{stg}	Storage Temperature	-65 to 200	°C
Tj	Max. Operating Junction Temperature	200	°C

March 2002 1/8

THERMAL DATA

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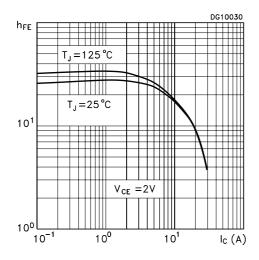
ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
I _{CER}	Collector Cut-off Current (R _{BE} = 5 Ω)	V _{CE} = 850 V V _{CE} = 850 V T _C = 100 °C			0.2 1	mA mA
I _{CEV}	Collector Cut-off Current (V _{BE} = -1.5V)	V _{CE} = 850 V V _{CE} = 850 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	450			V
V _{EBO}	Emitter Base Voltage (I _C = 0)	I _E = 50 mA	7			V
V _{CE(sat)} *	Collector-Emitter Saturation Voltage	$ \begin{aligned} &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 \\ &I_C = 20 \ A & &I_B = 4 \ A \ T_C = 100^{\circ}C \end{aligned} $		0.8	2.8	< < < <
V _{BE(sat)} *	Base-Emitter Saturation Voltage	I _C = 10A		0.9	1.5 1.5	V V V
di _c /dt	Rate of rise on-state Collector Current	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	70 150	100		A/μs A/μs A/μs
V _{CE} (3μs)	Collector-Emitter Dynamic Voltage	$\begin{tabular}{ll} $V_{CC} = 300 \ V & $R_C = 60 \ \Omega$ \\ $I_{B1} = 1.5 \ A$ & $T_C = 25^{\circ}C$ \\ $I_{B1} = 1.5 \ A$ & $T_C = 100^{\circ}C$ \\ \end{tabular}$		2.1	8	V V
V _{CE} (5μs)	Collector-Emitter Dynamic Voltage	$ \begin{array}{llllllllllllllllllllllllllllllllllll$		1.1	4	V V
t _s t _f t _c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$\begin{array}{lll} I_{C} = 10 \; A & & V_{CC} = 50 \; V \\ V_{BB} = -5 \; V & R_{BB} = 0.6 \; \; \Omega \\ V_{clamp} = 400 \; V & I_{B1} = 1 \; A \\ L = 0.25 \; mH & & \end{array}$		1 0.05 0.08		μs μs μs
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

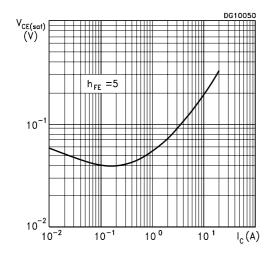
ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Co	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
ts 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
ts 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
V _{CEW}	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

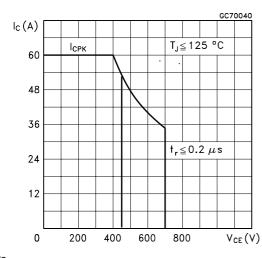
DC Current Gain



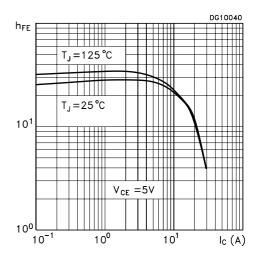
Collector Emitter Saturation Voltage



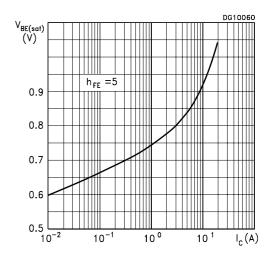
Forward Biased Safe Operating Area



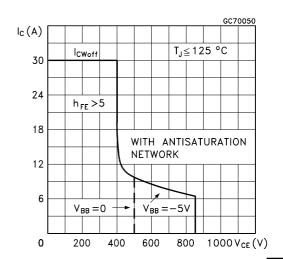
DC Current Gain



Base Emitter Saturation Voltage



Reverse Biased Safe Operating Area



Storage Time Versus Pulse Time.

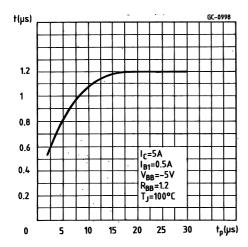
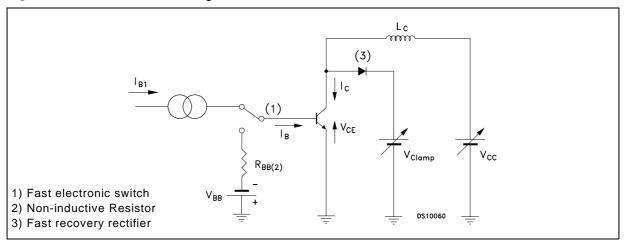
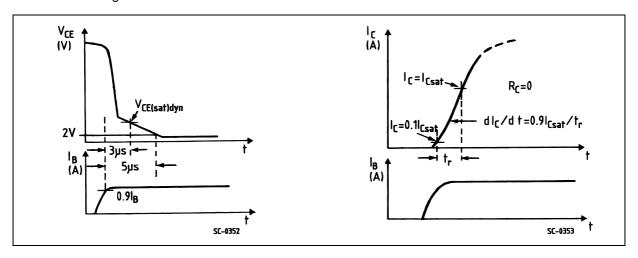


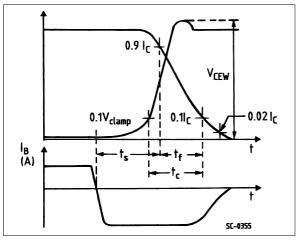
Figure 1: Inductive Load Switching Test Circuit.



Turn-on Switching Test Waveforms.

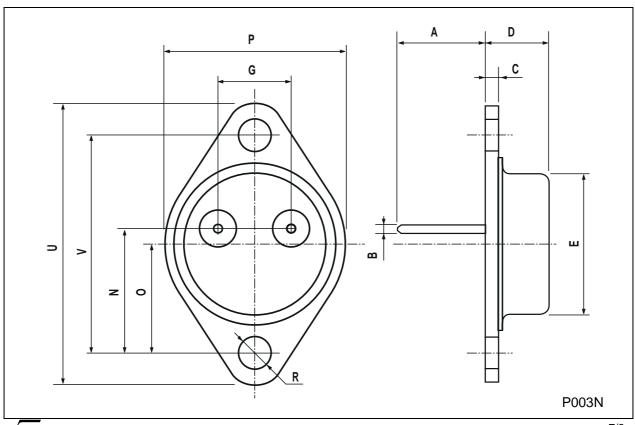


Turn-off Switching Test Waveforms (inductive load).



TO-3 (version R) MECHANICAL DATA

DIM.	mm			inch			
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
А		11.7			0.460		
В	0.96		1.10	0.037		0.043	
С			1.70			0.066	
D			8.7			0.342	
Е			20.0			0.787	
G		10.9			0.429		
N		16.9			0.665		
Р			26.2			1.031	
R	3.88		4.09	0.152		0.161	
U			39.50			1.555	
V		30.10			1.185		



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