



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

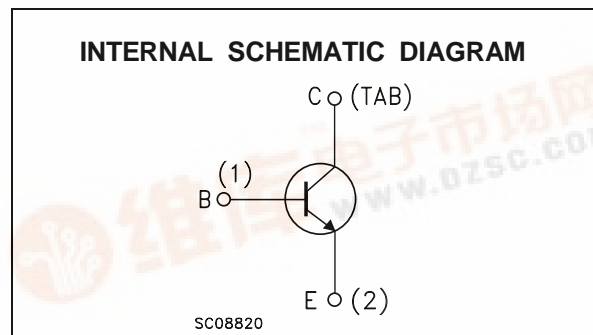
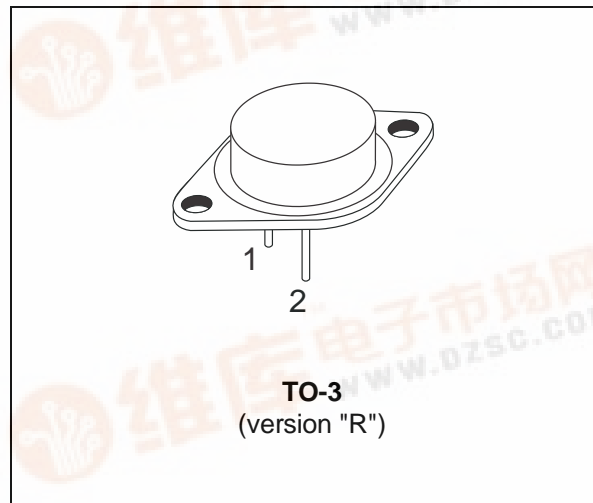
APPLICATIONS:

- 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
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	275	W
T_{stg}	Storage Temperature	-65 to 200	°C
T_j	Max. Operating Junction Temperature	200	°C



BUF420M

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-Case	Max	0.63	°C/W
----------------	----------------------------------	-----	------	------

ELECTRICAL CHARACTERISTICS ($T_{case} = 25\text{ °C}$ unless otherwise specified)

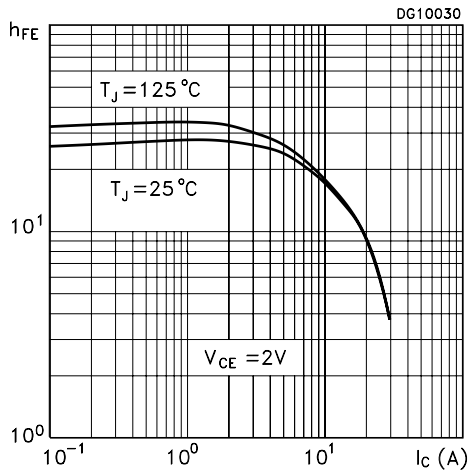
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CER}	Collector Cut-off Current ($R_{BE} = 5\ \Omega$)	$V_{CE} = 850\text{ V}$ $V_{CE} = 850\text{ V}$ $T_C = 100\text{ °C}$			0.2 1	mA mA
I_{CEV}	Collector Cut-off Current ($V_{BE} = -1.5\text{ V}$)	$V_{CE} = 850\text{ V}$ $V_{CE} = 850\text{ V}$ $T_C = 100\text{ °C}$			0.2 1	mA mA
I_{EBO}	Emitter Cut-off Current ($I_C = 0$)	$V_{EB} = 5\text{ V}$			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	$I_C = 10\text{ A}$ $I_B = 1\text{ A}$ $I_C = 10\text{ A}$ $I_B = 1\text{ A}$ $T_C = 100\text{ °C}$ $I_C = 20\text{ A}$ $I_B = 4\text{ A}$ $I_C = 20\text{ A}$ $I_B = 4\text{ A}$ $T_C = 100\text{ °C}$		0.8 0.5	2.8 2	V V V V
$V_{BE(sat)*}$	Base-Emitter Saturation Voltage	$I_C = 10\text{ A}$ $I_B = 1\text{ A}$ $I_C = 10\text{ A}$ $I_B = 1\text{ A}$ $T_C = 100\text{ °C}$ $I_C = 20\text{ A}$ $I_B = 4\text{ A}$ $I_C = 20\text{ A}$ $I_B = 4\text{ A}$ $T_C = 100\text{ °C}$		0.9 1.1	1.5 1.5	V V V V
di_c/dt	Rate of rise on-state Collector Current	$V_{CC} = 300\text{ V}$ $R_C = 0$ $t_p = 3\ \mu\text{s}$ $I_{B1} = 1.5\text{ A}$ $T_C = 25\text{ °C}$ $I_{B1} = 1.5\text{ A}$ $T_C = 100\text{ °C}$ $I_{B1} = 6\text{ A}$ $T_C = 100\text{ °C}$	70 150	100		A/ μs A/ μs A/ μs
$V_{CE(3\mu\text{s})}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300\text{ V}$ $I_{B1} = 1.5\text{ A}$ $I_{B1} = 1.5\text{ A}$		2.1	8	V V
$V_{CE(5\mu\text{s})}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300\text{ V}$ $I_{B1} = 1.5\text{ A}$ $I_{B1} = 1.5\text{ A}$		1.1	4	V V
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_C = 10\text{ A}$ $V_{BB} = -5\text{ V}$ $V_{clamp} = 400\text{ V}$ $L = 0.25\text{ mH}$		1 0.05 0.08		μs μs μs
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_C = 10\text{ A}$ $V_{BB} = -5\text{ V}$ $V_{clamp} = 400\text{ V}$ $L = 0.25\text{ mH}$			2 0.1 0.18	μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	$I_C = 10\text{ A}$ $V_{BB} = -5\text{ V}$ $I_{B1} = 1\text{ A}$ $T_C = 125\text{ °C}$	500			V
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_C = 10\text{ A}$ $V_{BB} = 0$ $V_{clamp} = 400\text{ V}$ $L = 0.25\text{ mH}$		1.5 0.04 0.07		μs μs μs

ELECTRICAL CHARACTERISTICS (continued)

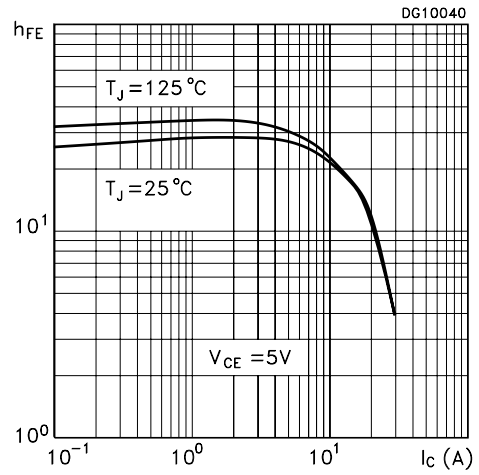
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Cross Over Time	$I_C = 10\text{ A}$ $V_{BB} = 0$ $V_{clamp} = 400\text{ V}$ $L = 0.25\text{ mH}$	$V_{CC} = 50\text{ V}$ $R_{BB} = 0.15\ \Omega$ $I_{B1} = 1\text{ A}$ $T_C = 100^\circ\text{C}$			3 0.15 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

BUF420M

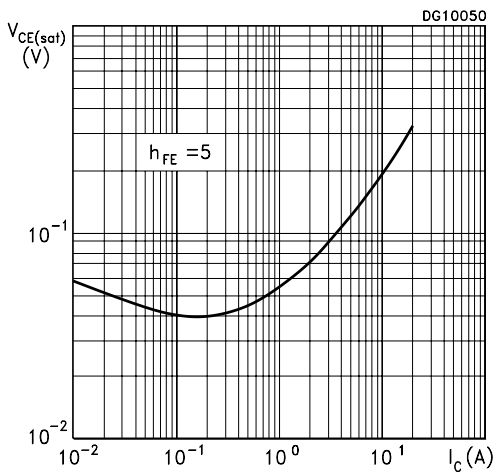
DC Current Gain



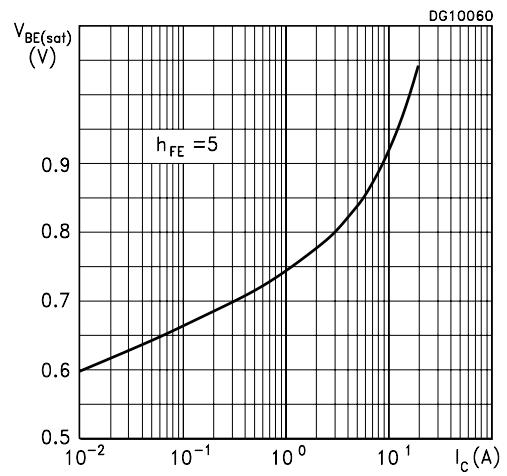
DC Current Gain



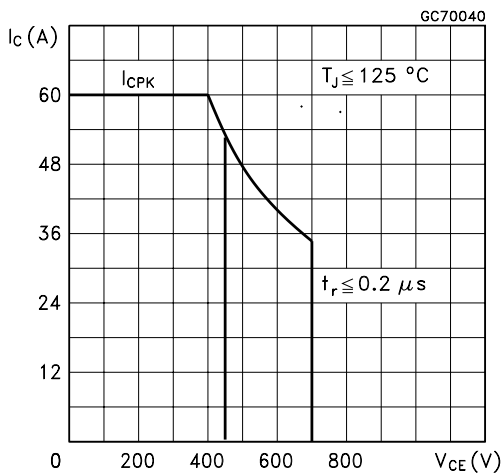
Collector Emitter Saturation Voltage



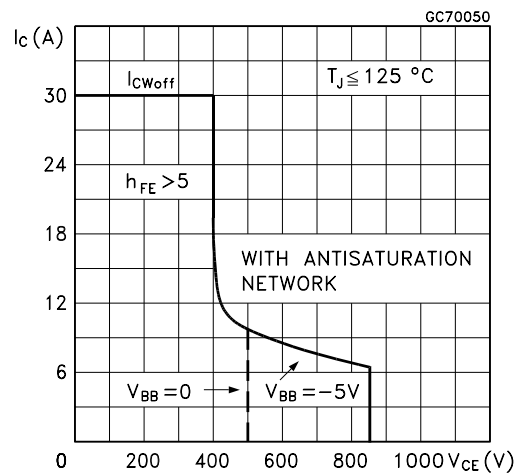
Base Emitter Saturation Voltage



Forward Biased Safe Operating Area



Reverse Biased Safe Operating Area



Storage Time Versus Pulse Time.

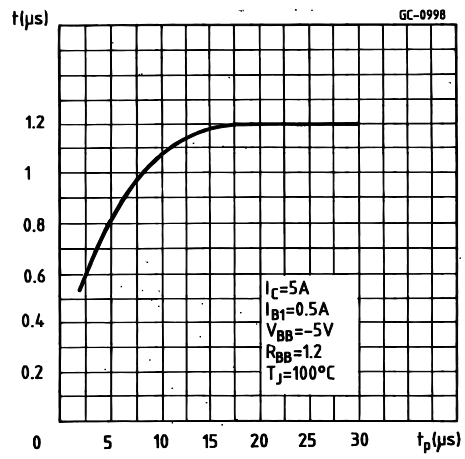
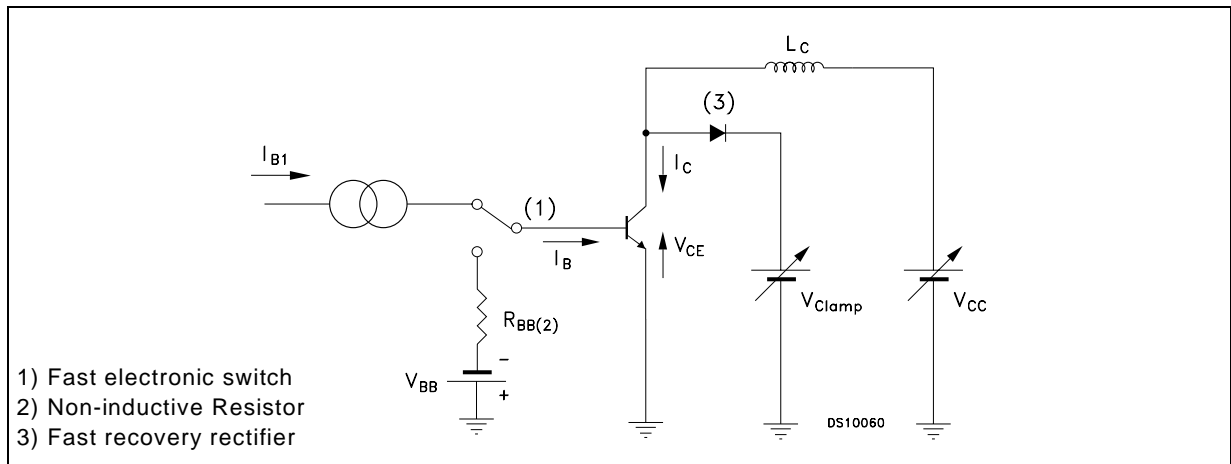
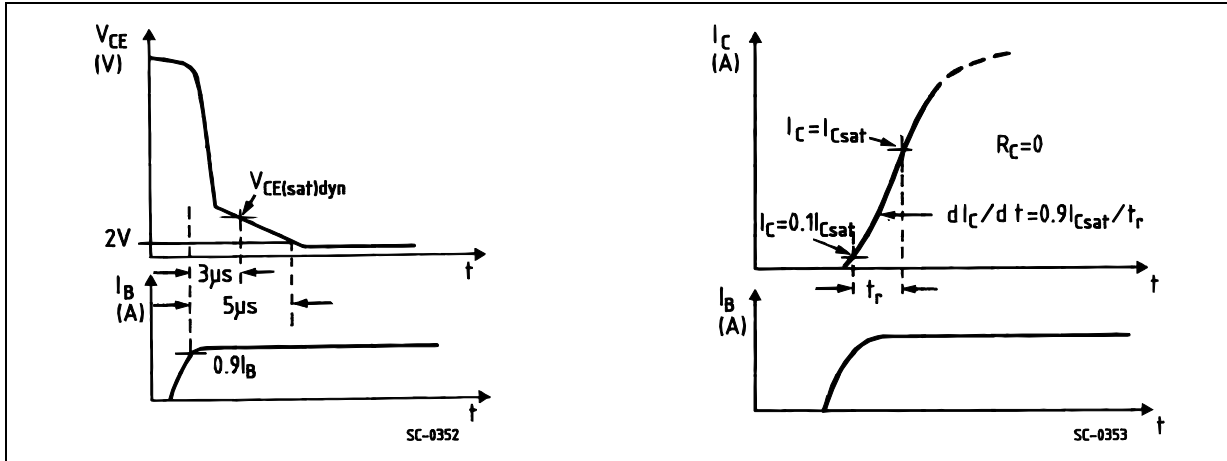


Figure 1: Inductive Load Switching Test Circuit.

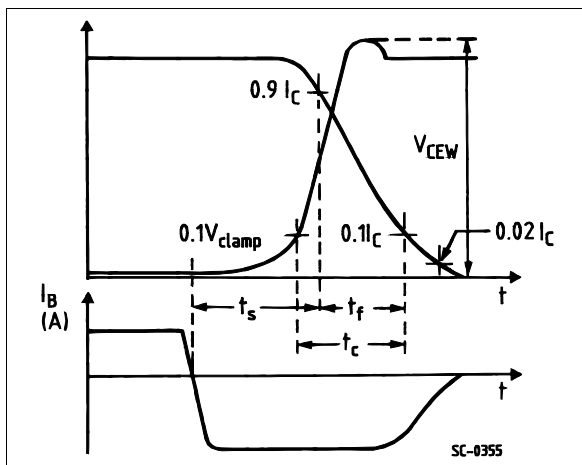


BUF420M

Turn-on Switching Test Waveforms.

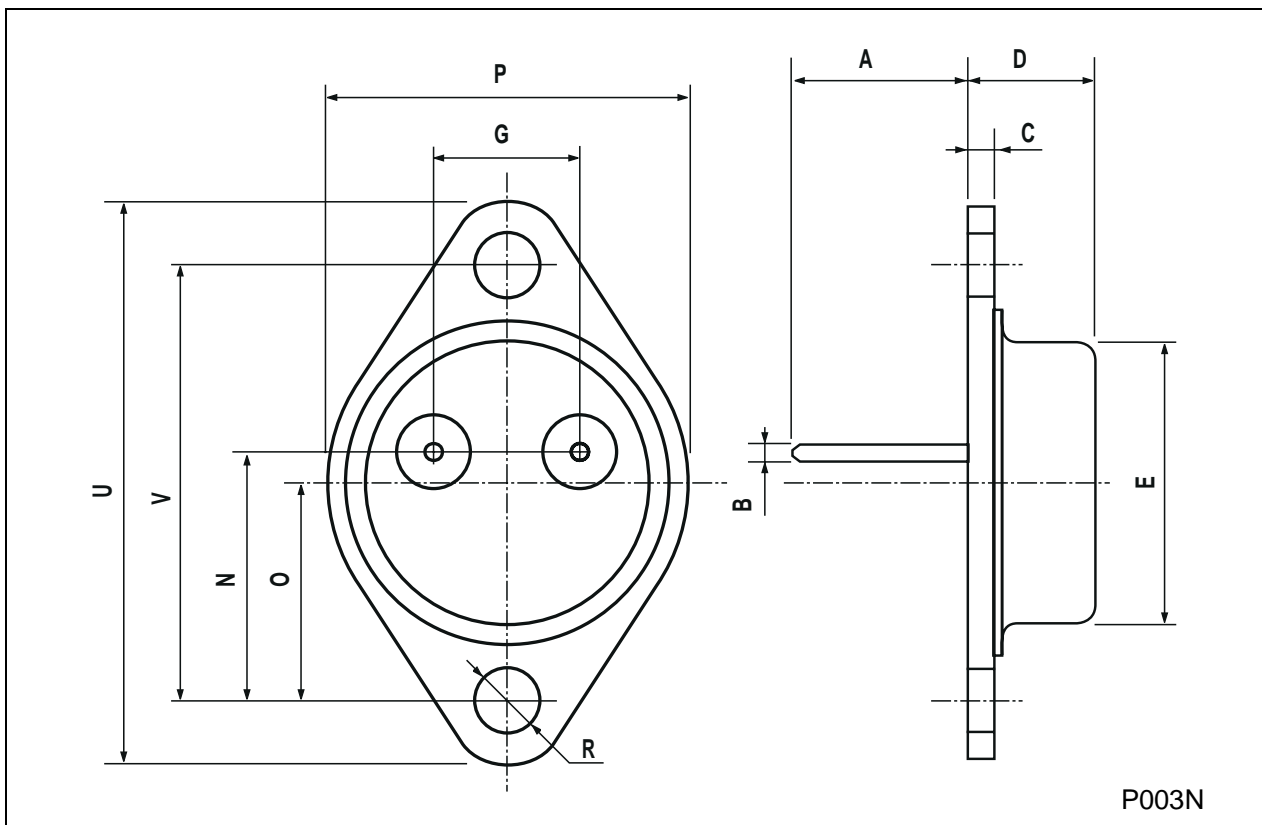


Turn-off Switching Test Waveforms (inductive load).



TO-3 (version R) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		11.7			0.460	
B	0.96		1.10	0.037		0.043
C			1.70			0.066
D			8.7			0.342
E			20.0			0.787
G		10.9			0.429	
N		16.9			0.665	
P			26.2			1.031
R	3.88		4.09	0.152		0.161
U			39.50			1.555
V		30.10			1.185	



P003N

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics

© 2002 STMicroelectronics – Printed in Italy – All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco -
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>