SGS-THOMSON MICROELECTRONICS

BUF420
BUF420M

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

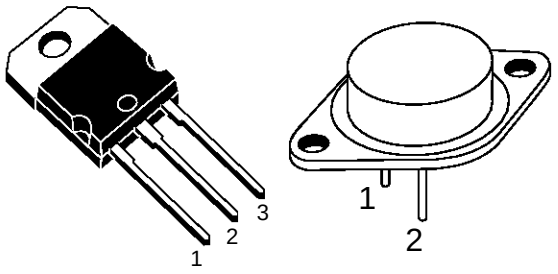
- SGS-THOMSON PREFERRED SALESTYPES
- NPN TRANSISTOR
- HIGH VOLTAGE CAPABILITY
- VERY HIGH SWITCHING SPEED
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- LOW BASE-DRIVE REQUIREMENTS

APPLICATIONS:
- SWITCH MODE POWER SUPPLIES
- MOTOR CONTROL

DESCRIPTION

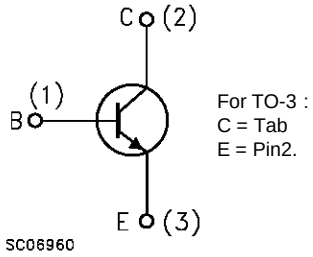
The BUF420 and BUF420M are manufactured using High Voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capacity. They use a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA.

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



TO-218 **TO-3**
(version "R")

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
V_{CEV}	Collector-Emitter Voltage (V_{BE} = -1.5 V)	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
		TO-218	**TO-3**	
P_{tot}	Total Dissipation at T_c = 25 °C	200	200	W
T_{stg}	Storage Temperature	-65 to 150		°C
T_j	Max Operation Junction Temperature	150		°C

THERMAL DATA

		TO-218	TO-3	
$R_{thj\text{-}case}$	Thermal Resistance Junction-Case Max	0.63	0.63	°C/W

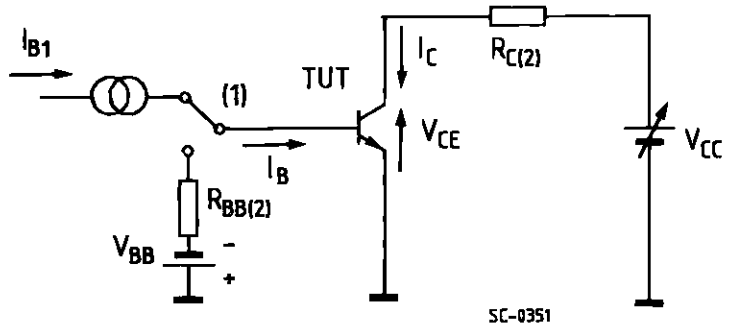
ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CER}	Collector Cut-off Current (R_{BE} = 5 Ω)	V_{CE} = V_{CEV} V_{CE} = V_{CEV} T_c = 100 °C			0.2 1	mA mA
I_{CEV}	Collector Cut-off Current (I_B = 0)	V_{CE} = V_{CEV} V_{BE} = -1.5 V V_{CE} = V_{CEV} V_{BE} = -1.5 V T_c =100°C			0.2 1	mA mA
I_{EBO}	Emitter Cut-off Current (I_C = 0)	V_{BE} = 5 V			1	mA
$V_{CEO(sus)}$*	Collector-Emitter Sustaining Voltage	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 = 2 A I_C = 20 A I_B = 2 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 = 2 A I_C = 20 A I_B = 2 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_j =25°C I_{B1} = 1.5 A T_j =100°C I_{B1} = 6 A T_j =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_j =25°C I_{B1} = 1.5 A T_j =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_j =25°C I_{B1} = 1.5 A T_j =100°C		 1.1 	 4	 V V
t_s t_f t_c	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} = 0.5 A L = 0.25 mH		1 0.05 0.08		µs µs µs
t_s t_f t_c	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_j =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 V_{clamp} = 400 V I_{B1} = 1 A L = 0.25 mH T_j =125°C	500			V
t_s t_f t_c	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)

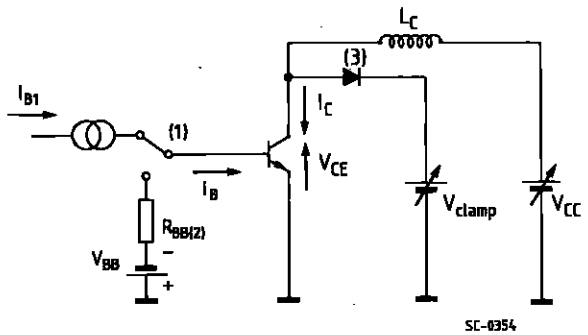
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t_s t_f t_c	Storage Time Fall Time Cross Over Time	I_C = 10 A V_{BB} = 0 V_{clamp} = 400 V L = 0.25 mH	V_{CC} = 50 V R_{BB} = 0.15 Ω I_{B1} = 1 A T_j =100°C			3 0.15 0.25	µs µs µs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	I_C = 10 A V_{BB} = 0 V_{clamp} = 400 V L = 0.25 mH	V_{CC} = 50 V R_{BB} = 0.15 Ω I_{B1} = 1 A T_j =125°C	500			V
t_s t_f t_c	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 V R_{BB} =0.6 Ω I_{B1} = 4 A		2.2 0.06 0.12		µs µs µs
t_s t_f t_c	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 V R_{BB} = 0.6 Ω I_{B1} = 4 A T_j =125°C			3.5 0.12 0.3	µs µs µs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	I_{CWoff} = 30 A V_{BB} = - 5 V L = 0.08 mH T_j =125°C	V_{CC} = 50 V R_{BB} = 0.6 Ω I_{B1} = 6 A	400			V

Figure 1: Turn-on Switching Test Circuit



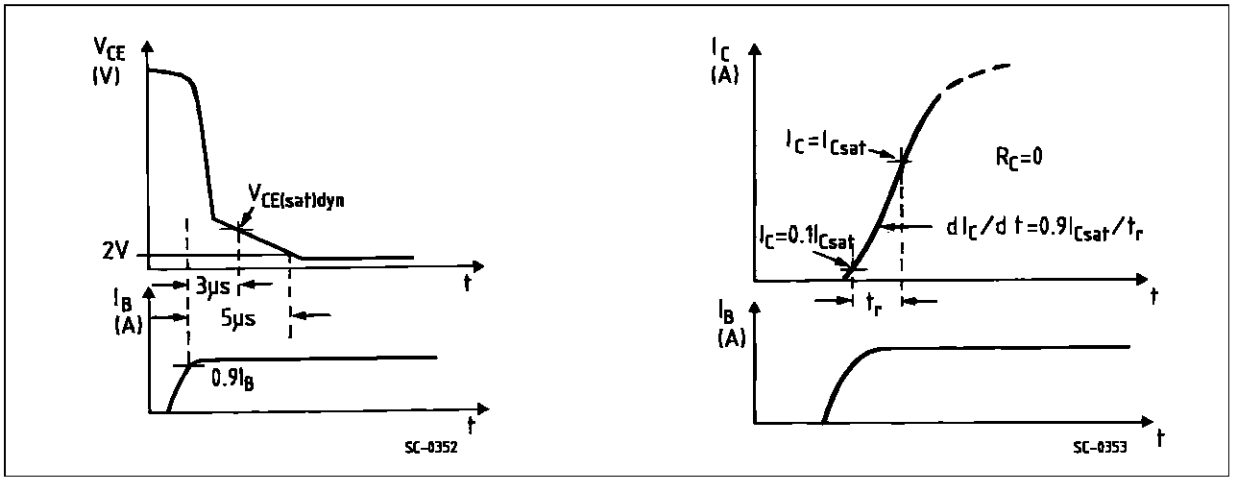
1) Fast electronic switch 2) Non inductive Resistor

Figure 2: Turn-off Switching Test Circuit

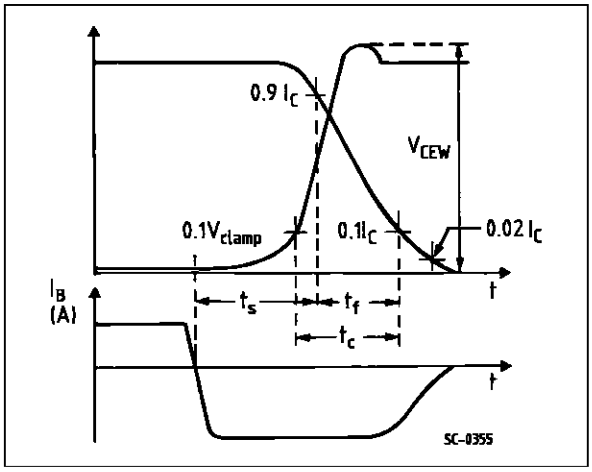


1) Fast electronic switch 2) Non inductive Resistor 3) Fast recovery rectifier

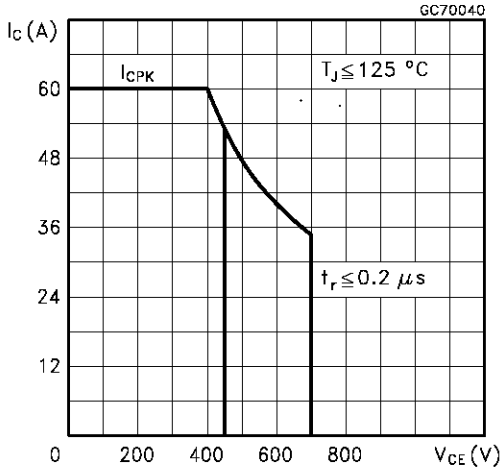
Turn-on Switching Test Waveforms.



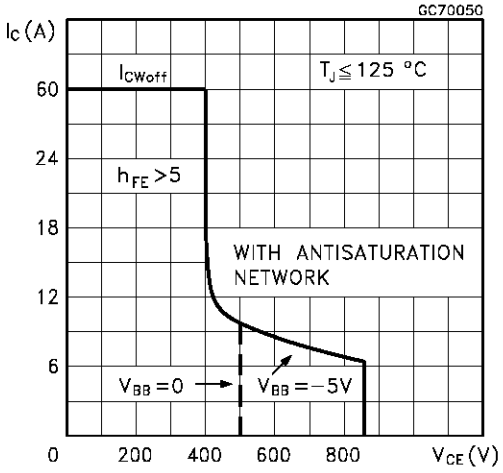
Turn-off SwitchingTest Waveforms (inductive load).



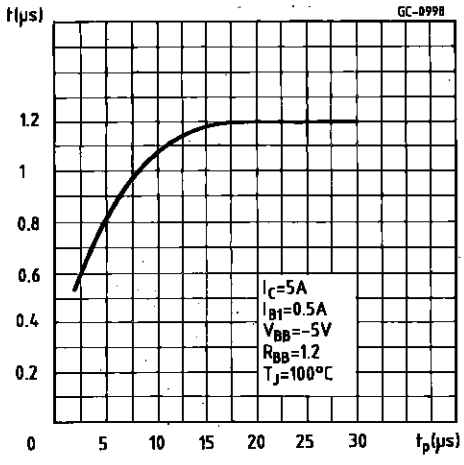
Forward Biased Safe Operating Areas.



Reverse Biased Safe Operating Area

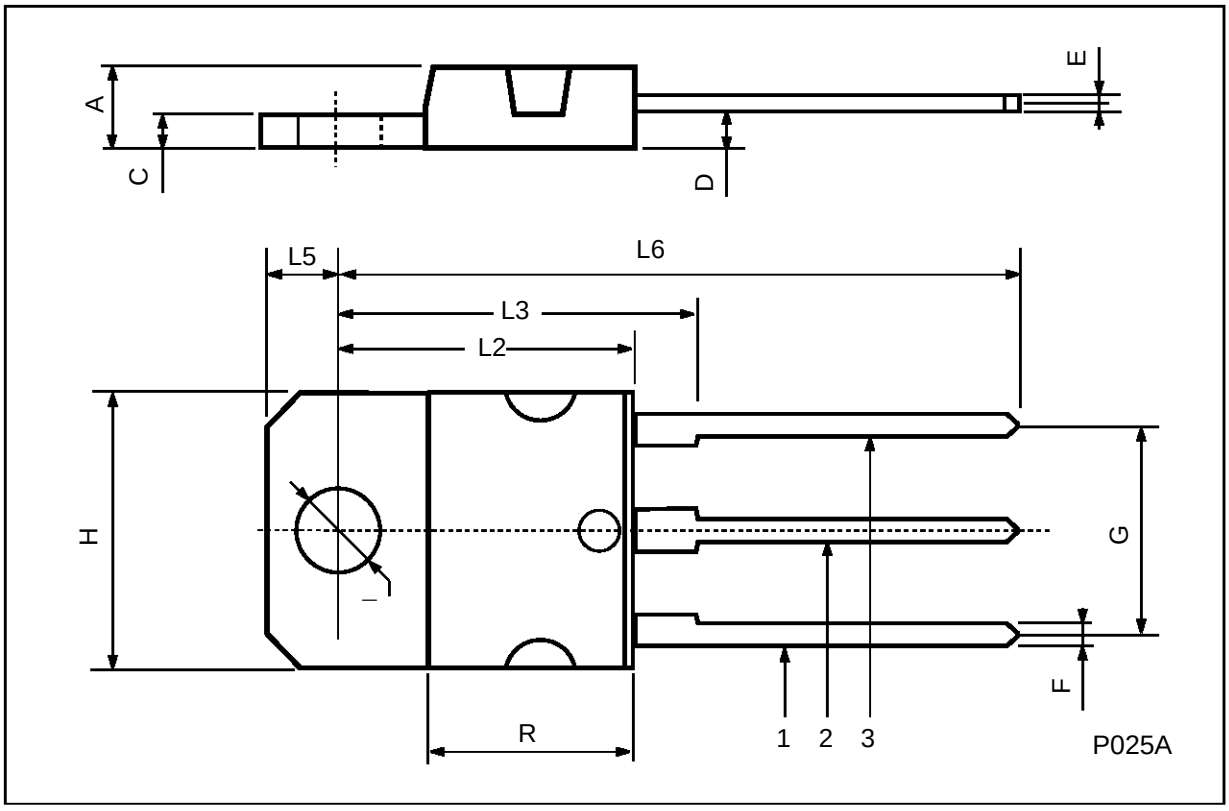


Storage Time Versus Pulse Time.



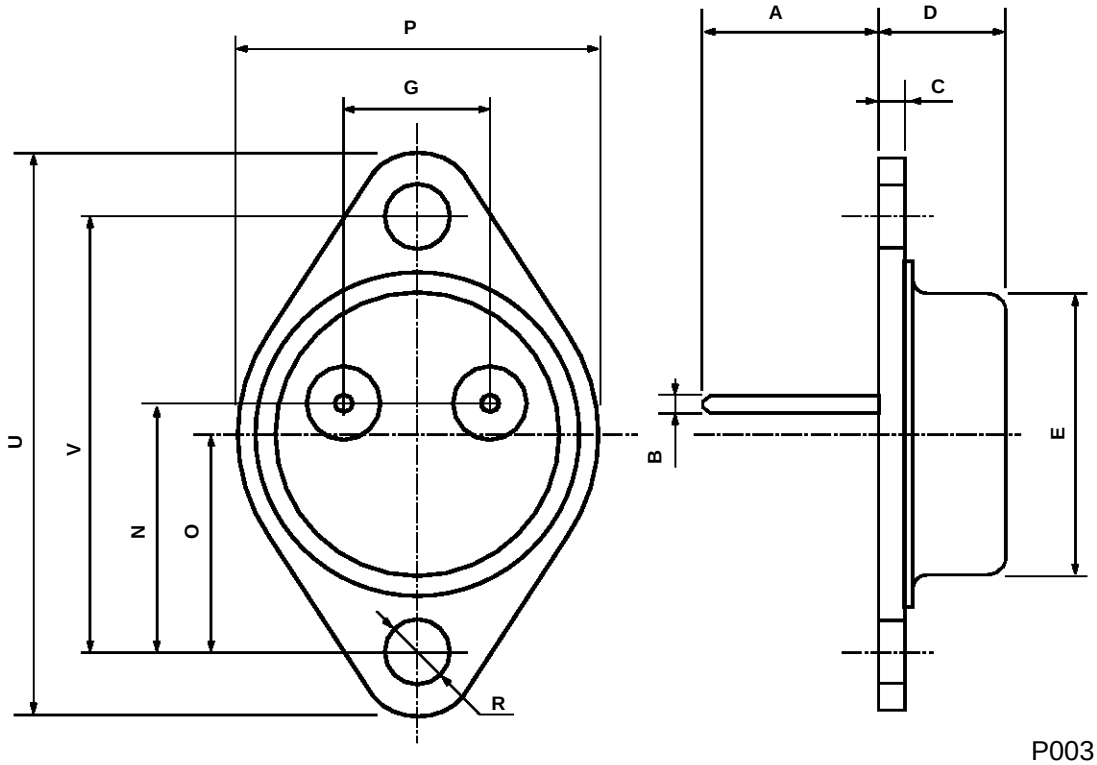
TO-218 (SOT-93) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.7		4.9	0.185		0.193
C	1.17		1.37	0.046		0.054
D		2.5			0.098	
E	0.5		0.78	0.019		0.030
F	1.1		1.3	0.043		0.051
G	10.8		11.1	0.425		0.437
H	14.7		15.2	0.578		0.598
L2	–		16.2	–		0.637
L3		18			0.708	
L5	3.95		4.15	0.155		0.163
L6		31			1.220	
R	–		12.2	–		0.480
Ø	4		4.1	0.157		0.161



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	



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