SGS-THOMSON MICROELECTRONICS

BUF405
BUF405A

FASTSWITCH EASY-TO-DRIVE (ETD) NPN TRANSISTORS

PRELIMINARY DATA

- HIGH SWITCHING SPEED NPN POWER TRANSISTORS
- EASY TO DRIVE
- HIGH VOLTAGE FOR OFF-LINE APPLICATIONS
- 100KHz SWITCHING SPEED
- LOW COST DRIVE CIRCUITS
- LOW DYNAMIC SATURATION

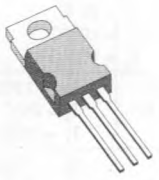
APPLICATIONS

- SMPS
- MOTOR DRIVES

DESCRIPTION

These Easy-to-Drive FASTSWITCH NPN power transistors are specially designed for high reliability industrial and professional power driving applications such as motor drives and off-line switching power supplies. ETD transistors will operate using easy drive circuits at up to 100KHz ; this helps to simplify designs and improve reliability. The superior switching performance and low crossover losses reduce dissipation and consequently lowers the equipment operating temperature. These ETD transistors are suitable for application in high reliability, low power, motor drives and in flyback and forward converters, 100W to 250W.

These EASY-TO-DRIVE FASTSWITCH transistors are available in the TO-220 package.



TO-220

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		BUF405	BUF405A	
V_{CEV}	Collector-emitter Voltage (V_{BE} = – 1.5V)	850	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	7.5		A
I_{CM}	Collector Peak Current	15		A
I_B	Base Current	3		A
I_{BM}	Base Peak Current	4.5		A
P_{tot}	Total Dissipation at T_c < 25°C	80		W
T_{stg}	Storage Temperature	– 65 to 150		°C
T_j	Max. Operating Junction Temperature	150		°C

THERMAL DATA

$R_{th\,j\text{-}case}$	Thermal Resistance Junction-case	Max	1.56	°C/W

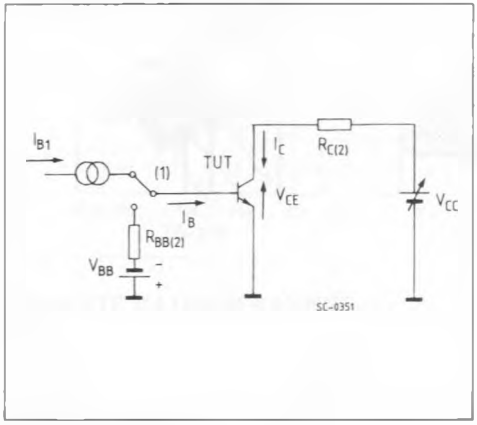
ELECTRICAL CHARACTERISTICS (T_j = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CER}	Collector Cutoff Current (R_{BE} = 5Ω)	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV}$ T_c = 100°C			0.1 0.5	mA mA
I_{CEV}	Collector Cutoff Current	$V_{CE} = V_{CEV}$ V_{BE} = − 1.5V $V_{CE} = V_{CEV}$ V_{BE} = − 1.5V T_c = 100°C			0.1 0.5	mA mA
I_{EBO}	Emitter Cutoff Current (I_C = 0)	V_{EB} = 5V			1	mA
$V_{CEO(sus)}$*	Collector Emitter Sustaining Voltage	I_C = 0.2A L = 25mH	450			V
V_{EBO}	Emitter-base Voltage (I_C = 0)	I_E = 50mA	7			V
$V_{CE(sat)}$*	Collector-emitter Saturation Voltage	I_C = 2.5A I_B = 0.25A I_C = 2.5A I_B = 0.25A T_c = 100°C I_C = 5A I_B = 1A I_C = 5A I_B = 1A T_c = 100°C		0.8 0.5 	 2.8 2	V V V V
$V_{BE(sat)}$*	Base-emitter Saturation Voltage	I_C = 2.5A I_B = 0.25A I_C = 2.5A I_B = 0.25A T_c = 100°C I_C = 5A I_B = 1A I_C = 5A I_B = 1A T_c = 100°C		0.9 1.1 	 1.5 1.5	V V V V
di_c/dt	Rate of Rise of on-state Collector Current	V_{CC} = 300V R_C = 0 t_p = 3µs I_{B1} = 0.375A T_j = 25°C I_{B1} = 0.375A T_j = 100°C I_{B1} = 1.5A T_j = 100°C	 30 60	 40 	 	A/µs A/µs A/µs
V_{CE}(3µs)	Collector-emitter Dynamic Voltage	V_{CC} = 300V R_C = 120Ω I_{B1} = 0.375A T_j = 25°C T_j = 100°C		 2.1 	 8	 V V
V_{CE}(5µs)	Collector-emitter Dynamic Voltage	V_{CC} = 300V R_C = 120Ω I_{B1} = 0.375A T_j = 25°C T_j = 100°C		 1.1 	 4	 V V
t_s t_f t_c	Storage Time Fall Time Cross Over Time	I_C = 2.5A V_{CC} = 50V V_{BB} = − 5V R_{BB} = 2.4Ω V_{clamp} = 400V I_{B1} = 0.25A L = 1mH		0.8 0.05 0.08	 	µs µs µs
t_s t_f t_c	Storage Time Fall Time Cross Over Time	I_C = 2.5A V_{CC} = 50V V_{BB} = − 5V R_{BB} = 2.4Ω V_{clamp} = 400V I_{B1} = 0.25A L = 1mH T_j = 100°C			1.8 0.1 0.18	µs µs µs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	I_C = 2.5A V_{CC} = 50V V_{BB} = − 5V R_{BB} = 2.4Ω V_{clamp} = 400V I_{B1} = 0.25A L = 1mH T_j = 125°C	500			V
t_s t_f t_c	Storage Time Fall Time Cross Over Time	I_C = 2.5A V_{CC} = 50V V_{BB} = 0 R_{BB} = 0.6Ω V_{clamp} = 400V I_{B1} = 0.25A L = 1mH		1.5 0.04 0.07	 	µs µs µs

ELECTRICAL CHARACTERISTICS (continued)

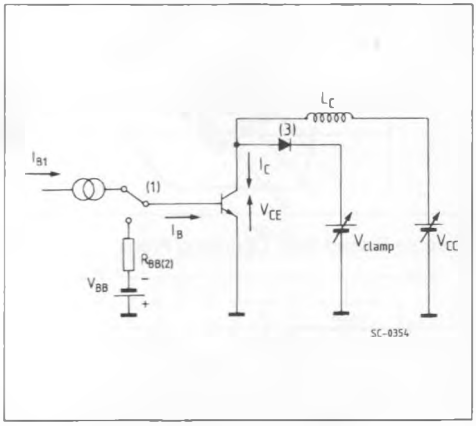
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t_s t_f t_c	Storage Time Fall Time Cross Over Time	I_C = 2.5A V_{BB} = 0 V_{clamp} = 400V L = 1mH	V_{CC} = 50V R_{BB} = 0.6Ω I_{B1} = 0.25A T_j = 100°C			3 0.15 0.25	µs µs µs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	I_C = 2.5A V_{BB} = 0 V_{clamp} = 400V L = 1mH	V_{CC} = 50V R_{BB} = 0.6Ω I_{B1} = 0.25A T_j = 125°C	500			V
t_s t_f t_c	Storage Time Fall Time Cross Over Time	I_C = 5A V_{BB} = – 5V V_{clamp} = 400V L = 0.5mH	V_{CC} = 50V R_{BB} = 2.4Ω I_{B1} = 1A		1.9 0.06 0.12		µs µs µs
t_s t_f t_c	Storage Time Fall Time Cross Over Time	I_C = 5A V_{BB} = – 5V V_{clamp} = 400V L = 0.5mH	V_{CC} = 50V R_{BB} = 2.4Ω I_{B1} = 1A T_j = 100°C			3.2 0.12 0.3	µs µs µs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	I_{CWoff} = 7.5A V_{BB} = – 5V L = 0.33mH T_j = 125°C	I_{B1} = 1.5A V_{CC} = 50V R_{BB} = 2.4Ω	400			V

Turn-on Switching Test Circuit.



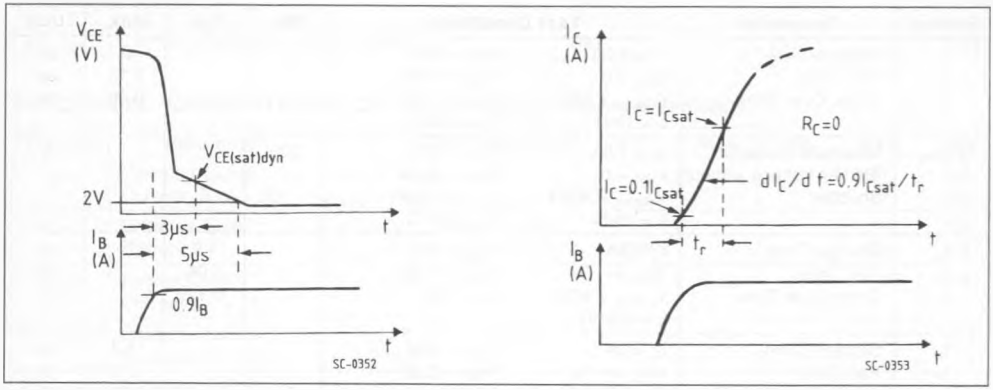
(1) Fast electronic switch
(2) Non-inductive Resistor

Turn-off Switching Test Circuit.

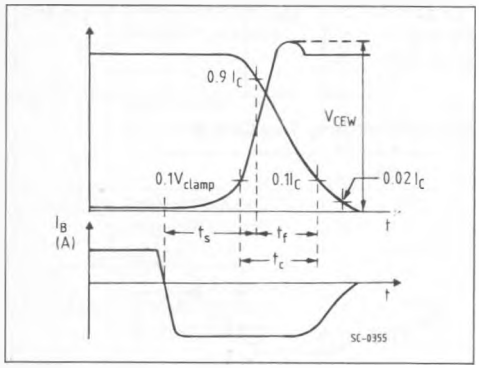


(1) Fast electronic switch
(2) Non-inductive Resistor
(3) Fast recovery rectifier

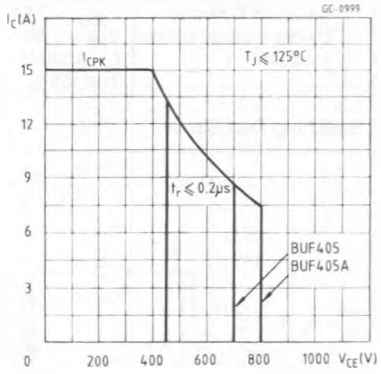
Turn-on Switching Test Waveforms.



Turn-off Switching Waveforms (inductive load).



Forward Biased Safe Operating Areas.



Reverse Biased Safe Operating Areas.