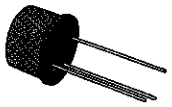
SGS-THOMSON MICROELECTRONICS

2N4014

HIGH-VOLTAGE, HIGH CURRENT SWITCH

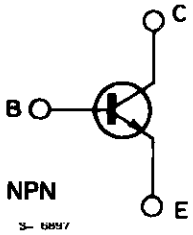
DESCRIPTION

The 2N4014 is a silicon planar epitaxial transistor in TO-18 metal case. It is a high-voltage, high current switch used for memory applications requiring breakdown voltages up to 50 V and operating currents to 1 A. Fast switching times are assured because of the high minimum fT (300 MHz) and tight control on storage time.



TO-18

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base Voltage (I_E = 0)	80	V
V_{CES}	Collector-emitter Voltage (V_{BE} = 0)	80	V
V_{CEO}	Collector-emitter Voltage (I_B = 0)	50	V
V_{EBO}	Emitter-base Voltage (I_C = 0)	6	V
I_C	Collector Current	1	A
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25$ °C at $T_{case} \leq 25$ °C	0.36 1.2	W W
T_{stg}, T_j	Storage and Junction Temperature	– 65 to 200	°C

THERMAL DATA

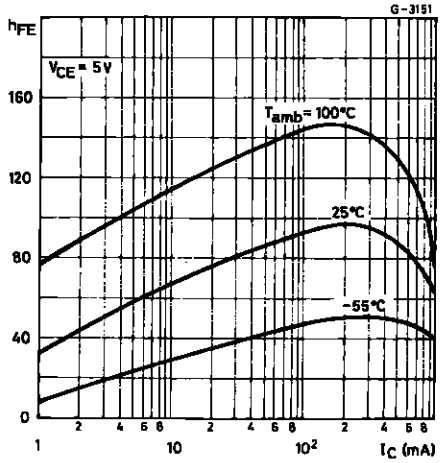
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	146	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	486	°C/W

ELECTRICAL CHARACTERISITCS(T_{amb} = 25 °C unless otherwise specified)

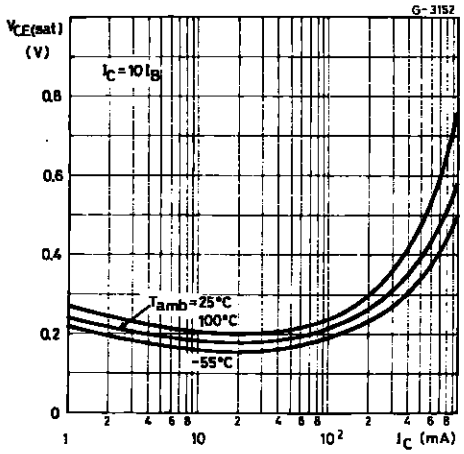
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current (I_E = 0)	V_{CB} = 60 V				1.7	µA
		V_{CB} = 60 V	T_{amb} = 100 °C			120	µA
$V_{(BR)CBO}$	Collector-base Breakdown Voltage (I_E = 0)	I_C = 10 µA		80			V
$V_{(BR)CES}$	Collector-emitter Breakdown Voltage (V_{BE} = 0)	I_C =10 µA		80			V
$V_{(BR)CEO}$*	Collector-Emitter Breakdown Voltage (I_B = 0)	I_C = 10 mA		50			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage (I_C = 0)	I_E =10 µA		6			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 10 mA	I_B =1 mA		0.19	0.25	V
		I_C = 100 mA	I_B =10 mA		0.21	0.26	V
		I_C = 300 mA	I_B = 30 mA		0.31	0.4	V
		I_C = 500 mA	I_B = 50 mA		0.4	0.52	V
		I_C = 800 mA	I_B = 80 mA		0.5	0.8	V
		I_C = 1000 mA	I_B = 100 mA		0.6	0.95	V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 10 mA	I_B = 1 mA		0.64	0.76	V
		I_C = 100 mA	I_B = 10 mA		0.75	0.86	V
		I_C = 300 mA	I_B = 30 mA		0.89	1.1	V
		I_C = 500 mA	I_B = 50 mA	0.9		1.2	V
		I_C = 800 mA	I_B = 80 mA		1.0	1.5	V
		I_C = 1000 mA	I_B = 100 mA		1.1	1.7	V
h_{FE}*	DC Current Gain	I_C = 10 mA	V_{CE} = 1 V	30	60		
		I_C = 100 mA	V_{CE} = 1 V	60	90	150	
		I_C = 300 mA	V_{CE} = 1 V	40	60		
		I_C = 1000 mA	V_{CE} = 5 V	25	65		
		I_C = 800 mA	V_{CE} = 2 V	20	40		
		I_C = 500 mA	V_{CE} = 1 V	35			
h_{fe}	High Frequency Current Gain	I_C = 50 mA f = 100 MHz	V_{CE} = 10 V	3			
C_{CBO}	Collector-base Capacitance	I_E = 0 f = 1 MHz	V_{CB} = 10 V			10	pF
C_{EBO}	Emitter-base Capacitance	I_C = 0 f = 1 MHz	V_{EB} = 0.5 V			55	pF
t_{on}**	Turn-on Time	I_C = 500 mA V_{CC} = 30 V	I_B = 50 mA			35	ns
t_{off}**	Turn-off Time	I_C = 500 mA I_{B1} = – I_{B2} = 50 mA	V_{CC} = 30 V			60	ns

* Pulsed : pulse duration = 300 ms, duty cycle = 1 %.
** See test circuit.

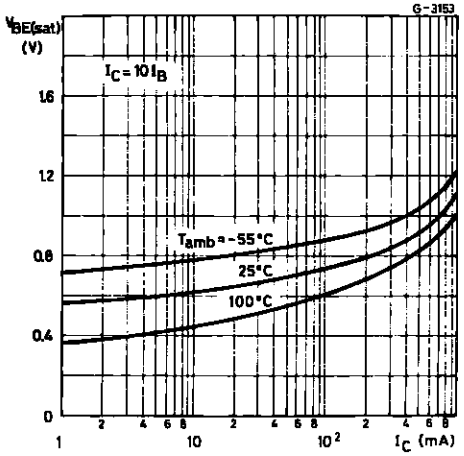
DC Current Gain.



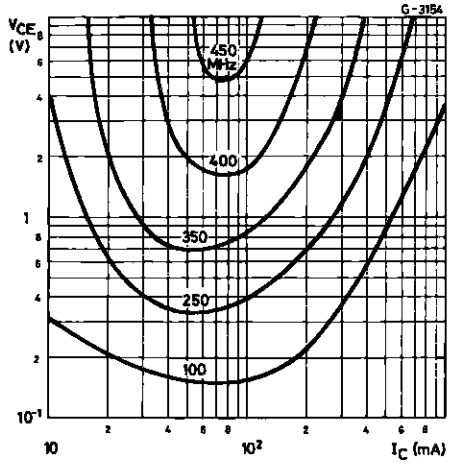
Collector-emitter Saturation Voltage.



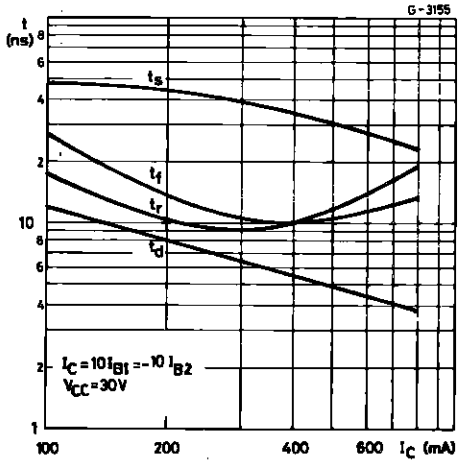
Base-emitter Saturation Voltage.



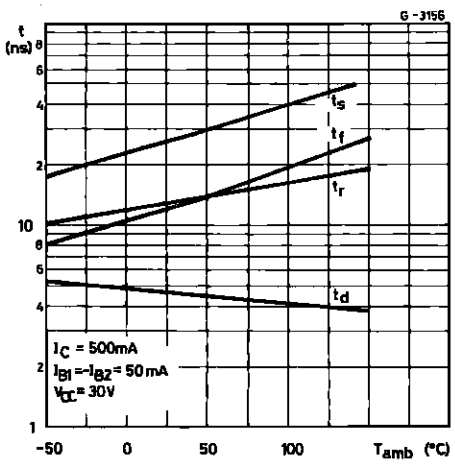
Contours of Constant Transition Frequency.



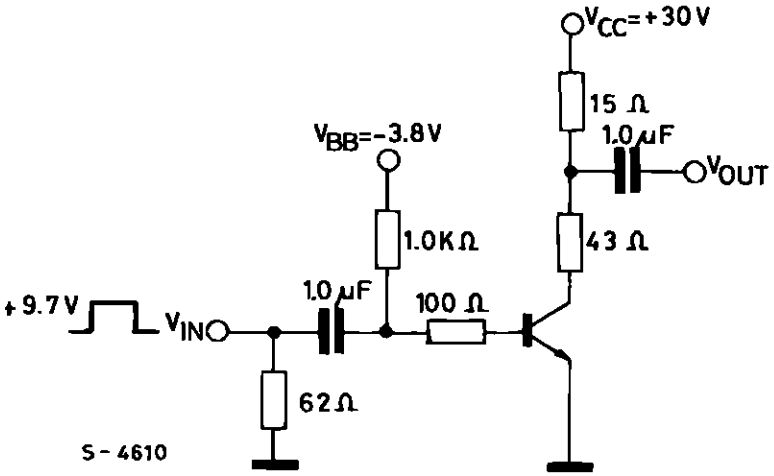
Switching Characteristics.



Switching Characteristics.



Test Circuit for t_{on}, t_{off}.

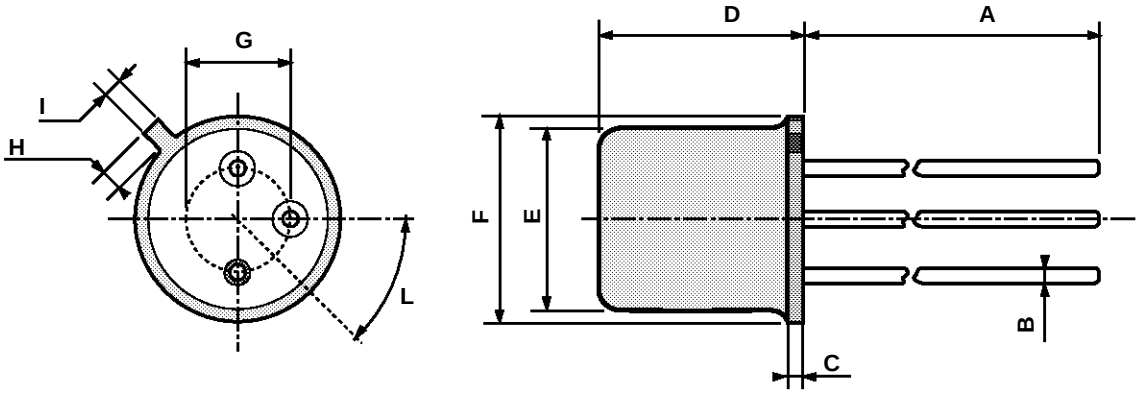


PULSE GENERATOR :
t_r, t_f < 1.0 ns
PW ≈ 1.0 µs
Z_{IN} = 50 Ω
DC < 2 %

TO OSCILLOSCOPE :
t_r ≈ 1.0 ns
Z_{IN} > 100 KΩ

TO-18 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		12.7			0.500	
B			0.49			0.019
D			5.3			0.208
E			4.9			0.193
F			5.8			0.228
G	2.54			0.100		
H			1.2			0.047
I			1.16			0.045
L	45^o			45^o		



0016043

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