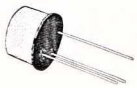
SGS-THOMSON MICROELECTRONICS

2N3013

HIGH SPEED SATURATED SWITCHES

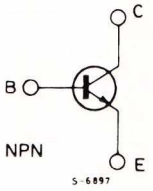
DESCRIPTION

The 2N3013 is a silicon planar epitaxial NPN transistor in Jedec TO-18 metal case intended for high speed low saturation switching application up to 300 mA.



TO-18

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base Voltage (I_E = 0)	40	V
V_{CES}	Collector-emitter Voltage (V_{BE} = 0)	40	V
V_{CEO}	Collector-emitter Voltage (I_B = 0)	15	V
V_{EBO}	Emitter-base Voltage (I_C = 0)	5	V
I_C	Collector Current	200	mA
I_C	Collector Peak Current (t < 10 μs)	500	mA
P_{tot}	Total Power Dissipation at T_{amb} < 25 °C at T_{case} < 25 °C at T_{case} < 100 °C	360 1200 680	mW mW mW
T_{stg}	Storage Temperature	– 55 to 200	°C
T_j	Max. Operating Junction Temperature	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 CHARACTERISTICS (T_{amb} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cutoff Current (V_{BE} = 0)	V_{CE} = 20 V V_{CE} = 20 V T_{amb} = 125 °C			300 40	nA μA
$V_{(BR)CBO}$	Collector-base Breakdown Voltage	I_C = 100 μA I_E = 0	40			V
$V_{(BR)CEO}$*	Collector-emitter Breakdown Voltage	I_C = 10 mA I_B = 0	15			V
$V_{(BR)EBO}$	Emitter-base Breakdown Voltage	I_E = 100 μA I_C = 0	5			V
h_{FE}*	DC Current Gain	V_{CE} = 0.4 V I_C = 30 mA V_{CE} = 0.5 V I_C = 100 mA V_{CE} = 1 V I_C = 300 mA V_{CE} = 0.4 V I_C = 30 mA T_{amb} = 55 °C	30 25 15 12		120	
$V_{CE(sat)}$*	Collector-emitter Saturation Voltage	I_C = 30 mA I_B = 3 mA I_C = 100 mA I_B = 10 mA I_C = 300 mA I_B = 30 mA I_C = 30 mA I_B = 3 mA T_{amb} = 125 °C			0.18 0.28 0.50 0.25	V V V V
$V_{BE(sat)}$*	Base-emitter Saturation Voltage	I_C = 30 mA I_B = 3 mA I_C = 100 mA I_B = 10 mA I_C = 300 mA I_B = 30 mA	0.75		0.95 1.20 1.70	V V V
f_T	Transition Frequency	V_{CE} = 10 V I_C = 30 mA f = 100 MHz	350			MHz
C_{CBO}	Collector-base Capacitance	V_{CB} = 5 V; I_E = 0 f = 1 MHz			5	pF
C_{EBO}	Emitter-base Capacitance	V_{EB} = 0.5 V; I_C = 0 f = 1 MHz			8	pF
t_{on}	Turn-on Time	V_{CC} = 15 V I_C = 300 mA I_{B1} = 30 mA			15	ns
t_{off}	Turn-off Time	V_{CC} = 15 V I_C = 300 mA I_{B1} = $-I_{B2}$ = 30 mA			25	ns
t_s	Storage Time	V_{CC} = 10 V I_C = 10 mA I_{B1} = $-I_{B2}$ = 10 mA			18	ns

* Pulsed : pulse duration = 300 μs, duty cycle = 1.5 %.