

Digital Transistors (Built-in Resistors)

DIGITAL TRANSISTOR (NPN)

General description

♦500 mA NPN Resistor-Equipped Transistors (RET) family.

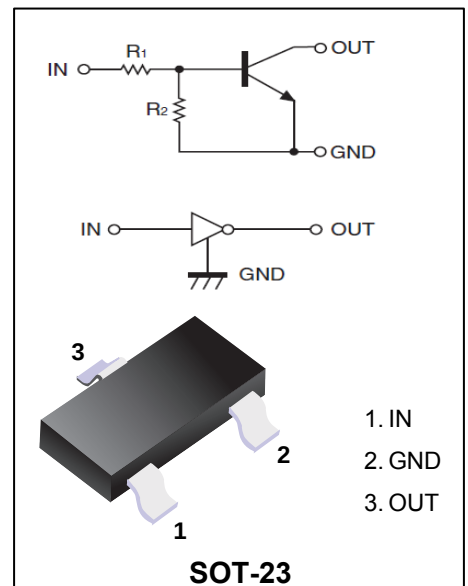
FEATURE

- ♦Built-in bias resistors
- ♦Simplifies circuit design
- ♦500 mA output current capability
- ♦Reduces component count
- ♦Reduces pick and place costs
- ♦±10 % resistor ratio tolerance

Applications

- ♦Digital application in automotive and industrial segments
- ♦Controlling IC inputs
- ♦Switching loads

Equivalent Circuit



Marking Code

DTD123ECA

7N

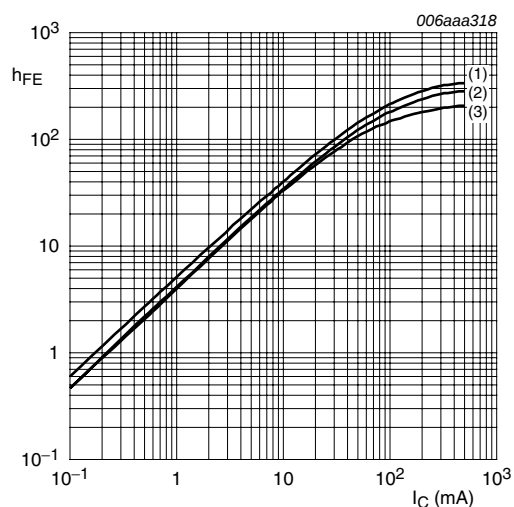
THERMAL CHARACTERISTICS

Parameter	Conditions	Symbol	Min	Max	Unit
collector-base voltage	open emitter	V_{CBO}	-	50	V
collector-emitter voltage	open base	V_{CEO}	-	50	V
emitter-base voltage	open collector	V_{EBO}	-	7	V
input voltage	positive	V_I	-	+12	V
	negative		-	-7	V
output current		I_O	-	500	mA
total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	P_{tot}	-	250	mW
junction temperature		T_j	-	150	°C
ambient temperature		T_{amb}	-65	+150	°C
storage temperature		T_{stg}	-65	+150	°C

ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted, common for Q 1 and Q 2 ,)(Continued)

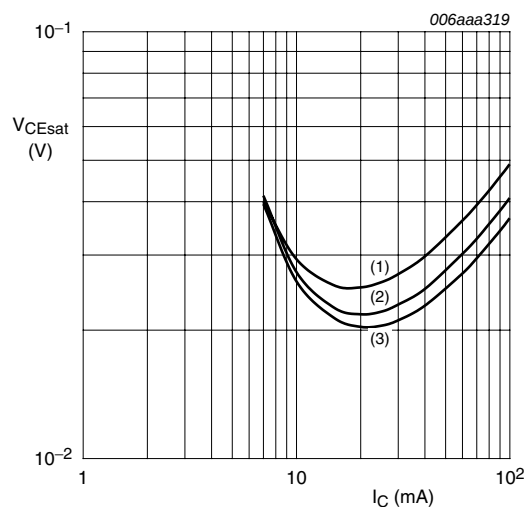
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
collector-base cut-off current	$V_{CB} = 50\text{ V}; I_E = 0\text{ A}$	I_{CBO}	-	-	100	nA
collector-emitter cut-off current	$V_{CE} = 50\text{ V}; I_B = 0\text{ A}$	I_{CEO}	-	-	0.5	μA
emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	I_{EBO}	-	-	3.8	mA
DC current gain	$V_{CE} = 5\text{ V}; I_C = 50\text{ mA}$	h_{FE}	40	-	-	
collector-emitter saturation voltage	$I_C = 50\text{ mA}; I_B = 2.5\text{ mA}$	V_{CEsat}	-	-	0.3	V
off-state input voltage	$V_{CE} = 5\text{ V}; I_C = 100\mu\text{A}$	$V_{I(off)}$	0.5	-	-	V
on-state input voltage	$V_{CE} = 0.3\text{ V}; I_C = 20\text{ mA}$	$V_{I(on)}$	-	-	3.0	V
bias resistor 1 (input)		R_1	1.54	2.2	2.86	KΩ
bias resistor ratio		R_2/R_1	0.8	1.0	1.2	
collector capacitance	$V_{CB} = 10\text{ V}; I_E = I_C = 0\text{ A}; f = 1\text{ MHz}$	C_c	-	7	-	pF

Typical Characteristi



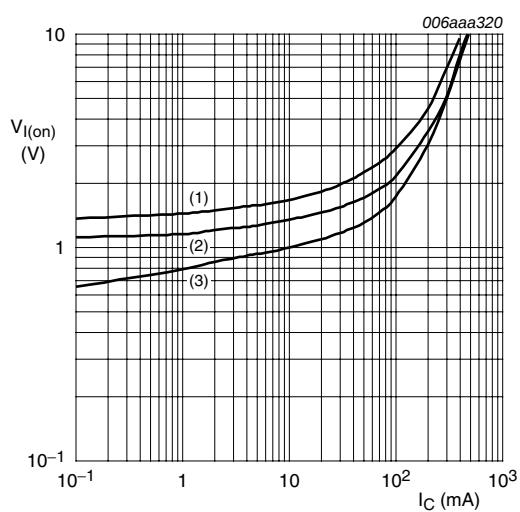
- $V_{CE} = 5\text{ V}$
- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 1. DC current gain as a function of collector current; typical values



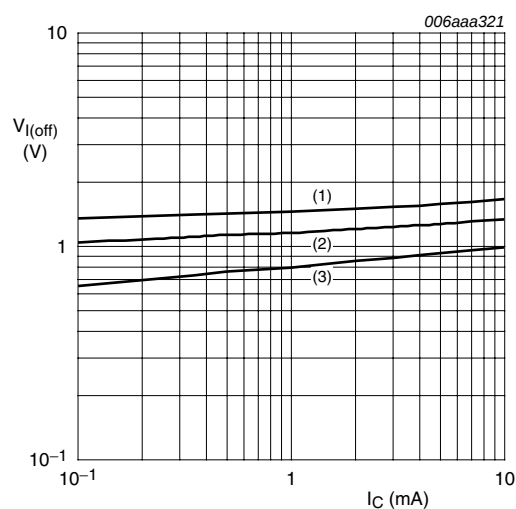
- $I_C/I_B = 20$
- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 2. Collector-emitter saturation voltage as a function of collector current; typical values



- $V_{CE} = 0.3\text{ V}$
- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

Fig 3. On-state input voltage as a function of collector current; typical values



- $V_{CE} = 5\text{ V}$
- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

Fig 4. Off-state input voltage as a function of collector current; typical values

Ordering information

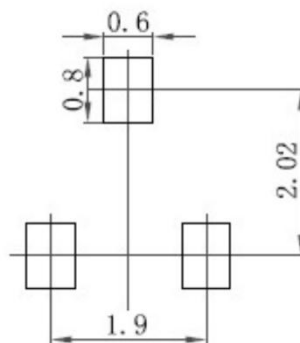
Package	Packing Description	Base Quantity	Packing Quantity
SOT-23	Tape/Reel, 7" reel	3000pcs/Reel	24000PCS/Box 120000PCS/Carton

Package Dimensions

SOT-23

Dim.	Millimeter (mm)		mil	
	Min.	Max.	Min.	Max.
A	0.9	1.15	35	45
A1	0.1		3.9	
bp	0.38	0.48	15	19
C	0.09	0.15	3.54	5.9
D	2.8	3.0	110	118
E	1.2	1.4	47	55
e	1.9		75	
e1	0.95		37	
HE	2.1	2.55	83	100
Lp	0.15	0.45	5.9	18
Q	0.45	0.55	18	22
v	0.2		7.9	
W	0.1		4	

The recommended mounting pad size



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