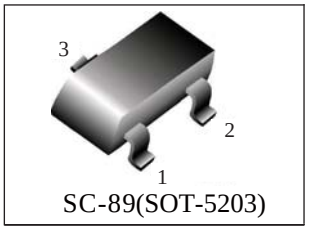
Digital transistors (built-in resistors)

NPN Silicon Surface Mount Transistor with Monolithic Bias Resistor Network

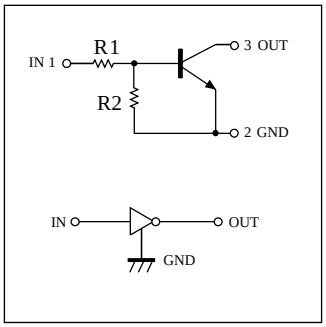


SC-89(SOT-5203)

- **Applications**
  Inverter, Interface, Driver

- **Features**
  1) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see equivalent circuit).
  2) The bias resistors consist of thin-film resistors with complete isolation to allow positive biasing of the input. They also have the advantage of almost completely eliminating parasitic effects.
  3) Only the on/off conditions need to be set for operation, making the device design easy.

- We declare that the material of product compliance with RoHS requirements.



●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Supply voltage	V_{CC}	50	V
Input voltage	V_{IN}	−5 to +30	V
Output current	I_O	100	mA
	$I_{C(Max.)}$	100	
Power dissipation	P_D	200	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	−55 to +150	°C

DEVICE MARKING AND RESISTOR VALUES

Device	Marking	R1 (K)	R2 (K)	Shipping
DTC506	8K	4.7	47	3000/Tape & Reel

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	$V_{I(off)}$	–	–	0.5	V	V_{CC}=5V, I_O=100μA
	$V_{I(on)}$	1.3	–	–		V_O=0.3V, I_O=5mA
Output voltage	$V_{O(on)}$	–	0.1	0.3	V	I_O/I_I=5mA/0.25mA
Input current	I_I	–	–	1.8	mA	V_I=5V
Output current	$I_{O(off)}$	–	–	0.5	μA	V_{CC}=50V, V_I=0V
DC current gain	G_I	80	–	–	–	V_O=5V, I_O=10mA
Input resistance	R_1	3.29	4.7	6.11	kΩ	–
Resistance ratio	R_2/R_1	8	10	12	–	–
Transition frequency	f_T □	–	250	–	MHz	V_{CE}=10V, I_E= -5mA, f=100MHz

□ Characteristics of built-in transistor

●Electrical characteristic curves

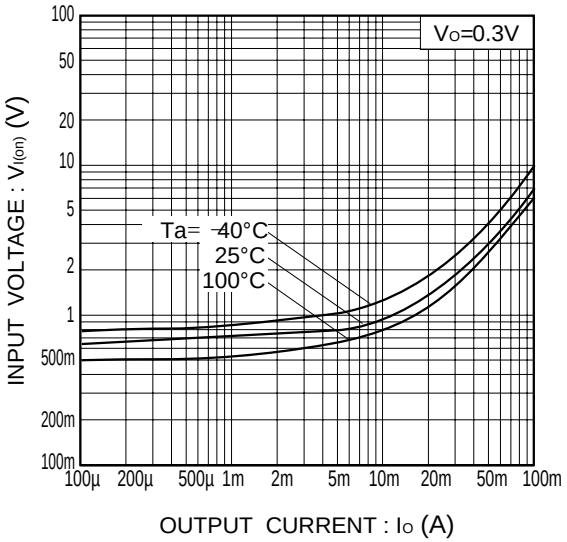


Fig.1 Input voltage vs. output current (ON characteristics)

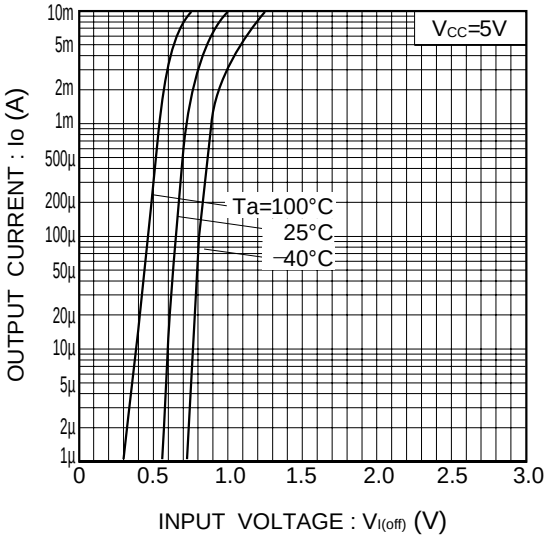


Fig.2 Output current vs. input voltage (OFF characteristics)

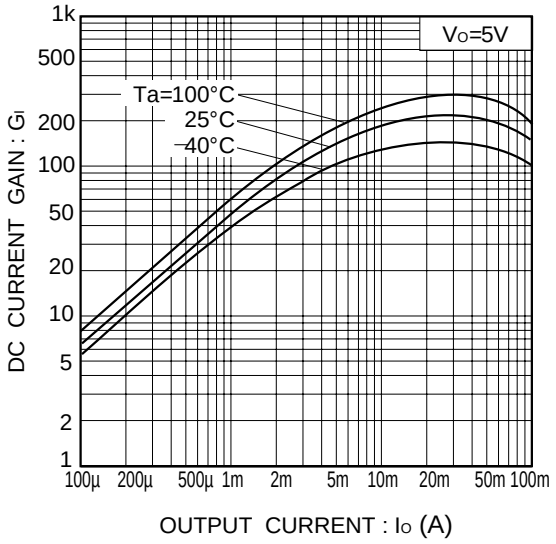


Fig.3 DC current gain vs. output current

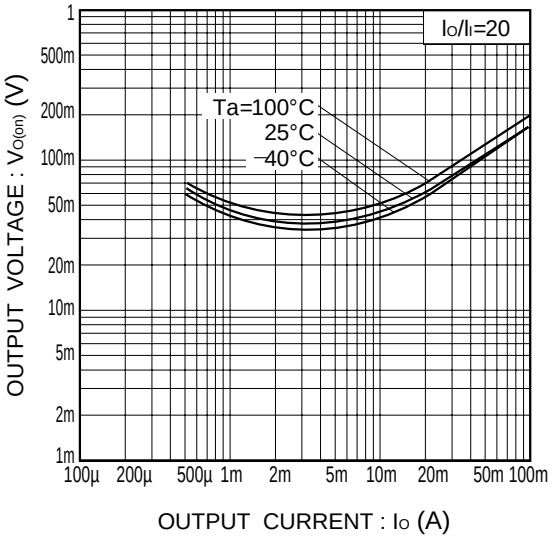
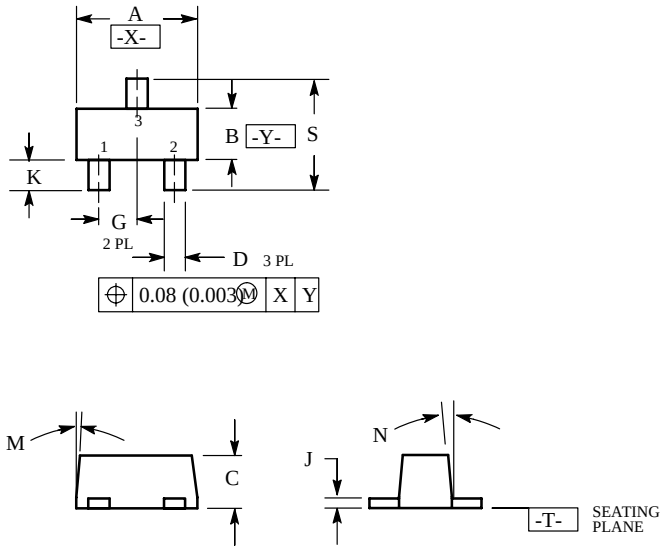


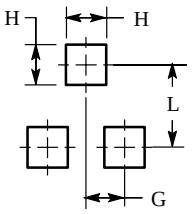
Fig.4 Output voltage vs. output current

SC−89 (SOT-523)



NOTES:
1 DIMENSIONING AND TOLERANCING PER ANSI Y14 5M, 1982
2 CONTROLLING DIMENSION: MILLIMETERS
3 MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL
4 463C-01 OBSOLETE, NEW STANDARD 463C-02

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10 °	---	---	10 °
N	---	---	10 °	---	---	10 °
S	1.50	1.60	1.70	0.059	0.063	0.067



RECOMMENDED PATTERN
OF SOLDER PADS