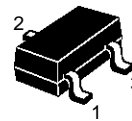


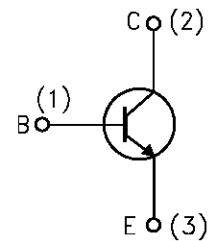
SMALL SIGNAL NPN TRANSISTOR

Type	Marking
SO3904	O71

- SILICON EPITAXIAL PLANAR NPN TRANSISTOR
- MINIATURE PLASTIC PACKAGE FOR APPLICATION IN SURFACE MOUNTING CIRCUITS
- GENERAL PURPOSE AMPLIFIER AND SWITCHING APPLICATIONS


SOT-23

INTERNAL SCHEMATIC DIAGRAM



SC08960

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Base Voltage ($I_E = 0$)	60	V
V_{CEO}	Collector-Emitter Voltage ($I_B = 0$)	40	V
V_{EBO}	Emitter-Base Voltage ($I_C = 0$)	6	V
I_C	Collector Current	0.2	A
P_{tot}	Total Dissipation at $T_c = 25\text{ }^\circ\text{C}$	300	mW
T_{stg}	Storage Temperature	-65 to 150	$^\circ\text{C}$
T_j	Max. Operating Junction Temperature	150	$^\circ\text{C}$

THERMAL DATA

$R_{thj-amb}$ •	Thermal Resistance Junction-Ambient	Max	420	$^{\circ}\text{C/W}$
R_{thj-SR} •	Thermal Resistance Junction-Substrate	Max	340	$^{\circ}\text{C/W}$

• Mounted on a ceramic substrate area = 8 x 10 x 0.6 mm

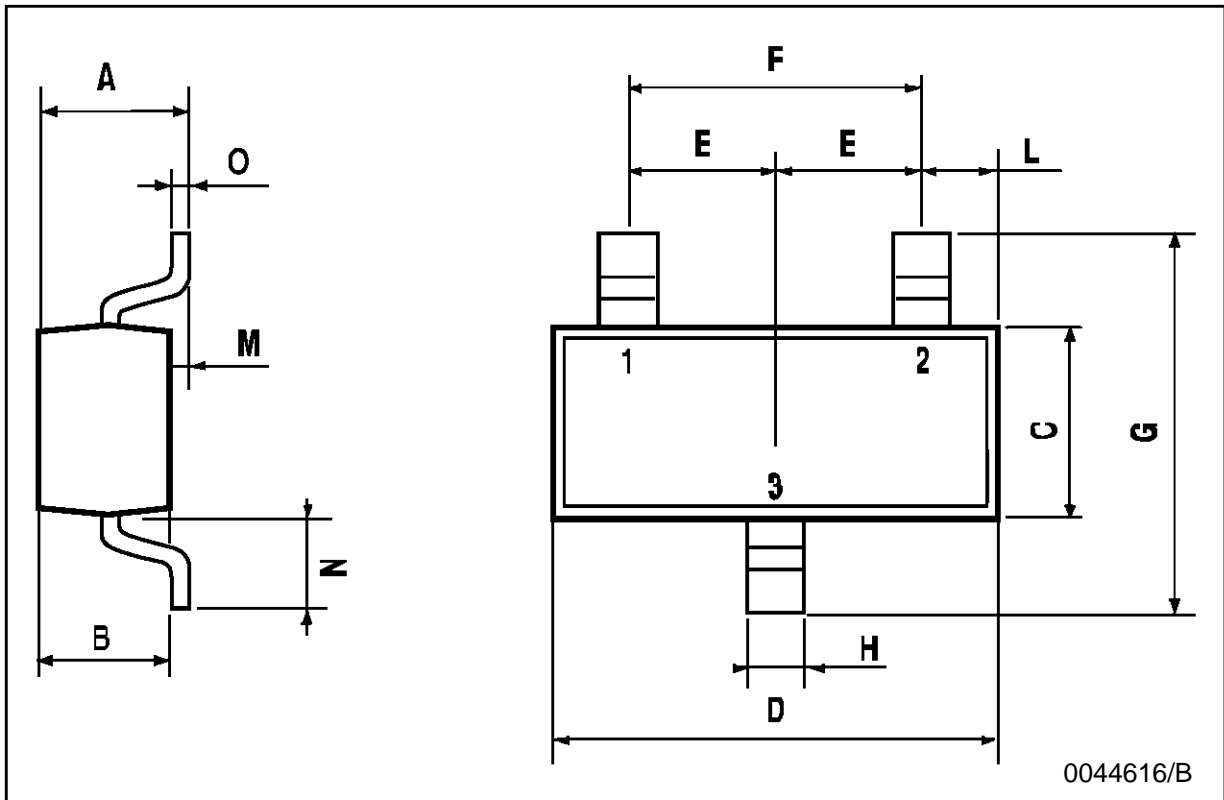
ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEV}	Collector Cut-off Current	$V_{CE} = 30\text{ V}$ $V_{BE} = 3\text{ V}$			50	nA
I_{BEV}	Base Cut-off Current	$V_{CE} = 30\text{ V}$ $V_{BE} = 3\text{ V}$			50	nA
$V_{(BR)CBO}^*$	Collector-Emitter Breakdown Voltage ($I_E = 0$)	$I_C = 10\ \mu\text{A}$	60			V
$V_{(BR)CEO}^*$	Collector-Emitter Breakdown Voltage ($I_B = 0$)	$I_C = 1\text{ mA}$	40			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ($I_C = 0$)	$I_E = 10\ \mu\text{A}$	6			V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 10\text{ mA}$ $I_B = 1\text{ mA}$ $I_C = 50\text{ mA}$ $I_B = 5\text{ mA}$			0.2 0.3	V V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 10\text{ mA}$ $I_B = 1\text{ mA}$ $I_C = 50\text{ mA}$ $I_B = 5\text{ mA}$			0.85 0.95	V V
h_{FE}^*	DC Current Gain	$I_C = 100\ \mu\text{A}$ $V_{CE} = 1\text{ V}$ $I_C = 1\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 10\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 50\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 100\text{ mA}$ $V_{CE} = 1\text{ V}$	40 70 100 60 30		300	
f_T	Transition Frequency	$I_C = 10\text{ mA}$ $V_{CE} = 20\text{ V}$ $f = 100\text{ MHz}$	300			MHz
C_{CB}	Collector Emitter Capacitance	$V_{CB} = 5\text{ V}$ $I_E = 0$ $f = 1\text{ MHz}$			4	pF
C_{EB}	Emitter Base Capacitance	$V_{BE} = 0.5\text{ V}$ $I_E = 0$ $f = 1\text{ MHz}$			8	pF
NF	Noise Figure	$V_{CE} = 5\text{ V}$ $I_C = 0.1\text{ mA}$ $f = 1\text{ KHz}$ $\Delta f = 200\text{ Hz}$ $R_G = 1\text{ K}\Omega$			5	dB
h_{ie}^*	Input Impedance	$I_C = 1\text{ mA}$ $V_{CE} = 1\text{ V}$ $f = 1\text{ KHz}$	1		10	$\text{K}\Omega$
h_{re}^*	Reverse Voltage Ratio		0.5		8	10^{-4}
h_{fe}^*	Small Signal Current Gain		100		400	
h_{oe}^*	Output Admittance		1		40	μS
t_d	Delay Time	$I_C = 10\text{ mA}$ $I_{B1} = 1\text{ mA}$			35	ns
t_r	Rise Time	$V_{BE\text{off}} = -0.5\text{ V}$			35	ns
t_s	Storage Time	$I_C = 10\text{ mA}$ $I_{B1} = 1\text{ mA}$			200	ns
t_f	Fall Time	$I_{B2} = -1\text{ mA}$			50	ns

* Pulsed: Pulse duration = 300 μs , duty cycle $\leq 2\%$

SOT-23 MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.85		1.1	33.4		43.3
B	0.65		0.95	25.6		37.4
C	1.20		1.4	47.2		55.1
D	2.80		3	110.2		118
E	0.95		1.05	37.4		41.3
F	1.9		2.05	74.8		80.7
G	2.1		2.5	82.6		98.4
H	0.38		0.48	14.9		18.8
L	0.3		0.6	11.8		23.6
M	0		0.1	0		3.9
N	0.3		0.65	11.8		25.6
O	0.09		0.17	3.5		6.7



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