

# MOTOROLA SEMICONDUCTOR TECHNICAL DATA

**NOT RECOMMENDED  
FOR NEW DESIGNS**

## UNIWATT SILICON ANNUULAR TRANSISTORS

Designed for complementary symmetry audio circuits to 10 Watt output.

- Low Collector-Emitter Saturation Voltage –  
 $V_{CE(sat)} = 0.5 \text{ Vdc (Max) @ } I_C = 1.0 \text{ Adc}$
- Complements to PNP MPS-U51 and MPS-U51A
- Uniwatt Package for Excellent Thermal Properties –  
1.0 Watt @  $T_A = 25^\circ\text{C}$

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### MAXIMUM RATINGS

Rating	Symbol	MPS-U01	MPS-U01A	Unit
Collector-Emitter Voltage	$V_{CEO}$	30	40	Vdc
Collector-Base Voltage	$V_{CB}$	40	50	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0		Vdc
Collector Current – Continuous	$I_C$	2.0		A dc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0	8.0	Watt mW/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	10	80	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150		$^\circ\text{C}$

### THERMAL CHARACTERISTICS

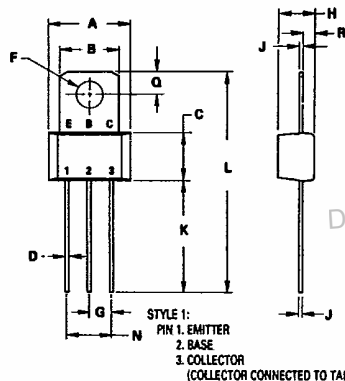
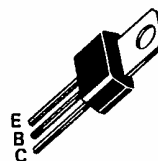
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	12.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}(1)$	125	$^\circ\text{C/W}$

(1)  $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.

Uniwatt packages can be To-5 lead formed by adding -5 to the device title and tab formed for flush mounting by adding -1 to the device title.

## MPS-U01 MPS-U01A

### NPN SILICON AUDIO TRANSISTORS



NOTE:

1. LEADS WITHIN 0.15 mm(0.006) TOTAL OF TRUE POSITION AT CASE, AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.14	9.53	0.360	0.375
B	6.60	7.24	0.260	0.286
C	5.41	5.66	0.213	0.223
D	0.38	0.53	0.015	0.021
F	3.18	3.33	0.125	0.131
G	2.54 BSC		0.100 BSC	
H	3.94	4.19	0.155	0.165
J	0.36	0.41	0.014	0.016
K	11.68	12.70	0.460	0.500
L	24.50	25.53	0.969	1.005
N	5.08 BSC		0.200 BSC	
Q	2.29	2.69	0.094	0.106
R	1.14	1.40	0.045	0.055

CASE 152-02

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ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit	
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Breakdown Voltage (1) ( $I_C = 10 \text{ mA}$ , $I_B = 0$ )	MPS-U01 MPS-U01A	$V_{(BR)CEO}$	30 40	— —	Vdc
Collector-Base Breakdown Voltage ( $I_C = 100 \mu\text{A}$ , $I_E = 0$ )	MPS-U01 MPS-U01A	$V_{(BR)CBO}$	40 50	— —	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 100 \mu\text{A}$ , $I_C = 0$ )		$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current ( $V_{CB} = 30 \text{ Vdc}$ , $I_E = 0$ ) ( $V_{CB} = 40 \text{ Vdc}$ , $I_E = 0$ )	MPS-U01 MPS-U01A	$I_{CBO}$	— —	0.1 0.1	$\mu\text{A}$
Emitter Cutoff Current ( $V_{BE} = 3.0 \text{ Vdc}$ , $I_C = 0$ )		$I_{EBO}$	—	0.1	$\mu\text{A}$
<b>ON CHARACTERISTICS(1)</b>					
DC Current Gain ( $I_C = 10 \text{ mA}$ , $V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 100 \text{ mA}$ , $V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 1.0 \text{ A}$ , $V_{CE} = 1.0 \text{ Vdc}$ )		$h_{FE}$	55 60 50	— — —	—
Collector-Emitter Saturation Voltage ( $I_C = 1.0 \text{ A}$ , $I_B = 0.1 \text{ A}$ )		$V_{CE(sat)}$	—	0.5	Vdc
Base-Emitter On Voltage ( $I_C = 1.0 \text{ A}$ , $V_{CE} = 1.0 \text{ Vdc}$ )		$V_{BE(on)}$	—	1.2	Vdc
<b>DYNAMIC CHARACTERISTICS</b>					
Current-Gain-Bandwidth Product ( $I_C = 50 \text{ mA}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 20 \text{ MHz}$ )		$f_T$	50	—	MHz
Output Capacitance ( $V_{CB} = 10 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )		$C_{ob}$	—	20	pF

(1) Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

FIGURE 1 — DC CURRENT GAIN DataSheet4U.com

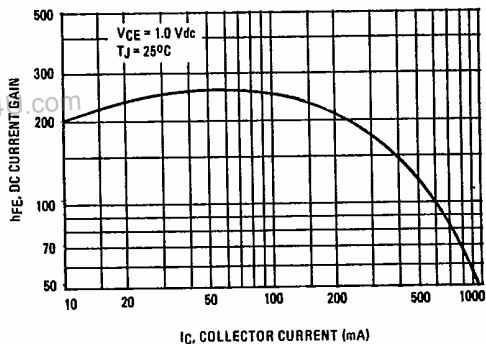


FIGURE 2 — "ON" VOLTAGES

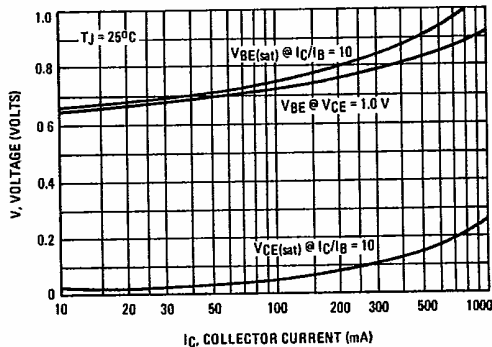
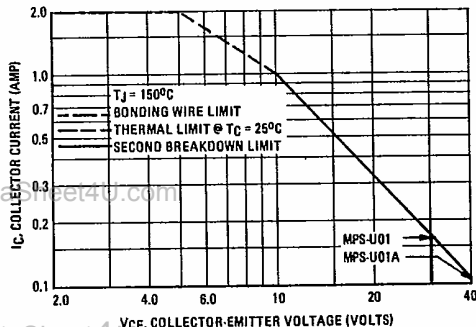


FIGURE 3 — DC SAFE OPERATING AREA



There are two limitations on the power handling ability of a transistor: junction temperature and secondary breakdown. Safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 3 is based on  $T_J = 150^\circ\text{C}$ . The safe operating area is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.