

**MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA**

**MPS-U01
MPS-U01A**

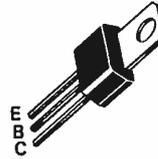
**NOT RECOMMENDED
FOR NEW DESIGNS**

UNIWATT SILICON ANNULAR 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 @ $T_A = 25^\circ\text{C}$

**NPN SILICON
AUDIO TRANSISTORS**



MAXIMUM RATINGS

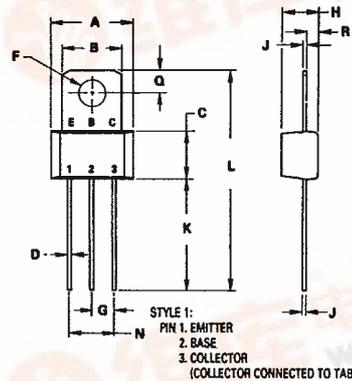
Rating	Symbol	MPS-U01	MPS-U01A	Unit
Collector-Emitter Voltage	V_{CEO}	30	40	Vdc
Collector-Base Voltage	V_{CB}	40	50	Vdc
Emitter-Base Voltage	V_{EB}		5.0	Vdc
Collector Current – Continuous	I_C		2.0	A dc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D		1.0 8.0	Watt mW/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°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.



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	11.63	12.70	0.458	0.500
L	24.58	25.53	0.968	1.005
M	5.08 BSC		0.200 BSC	
Q	2.39	2.69	0.094	0.106
R	1.14	1.40	0.045	0.055

CASE 152-02



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

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

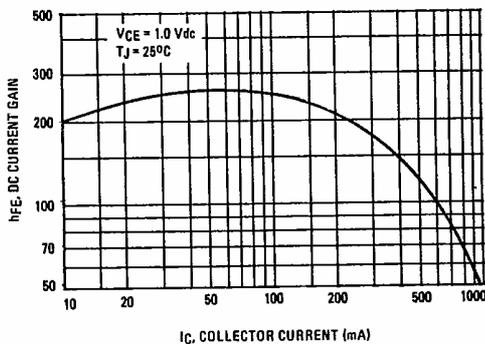


FIGURE 2 — "ON" VOLTAGES

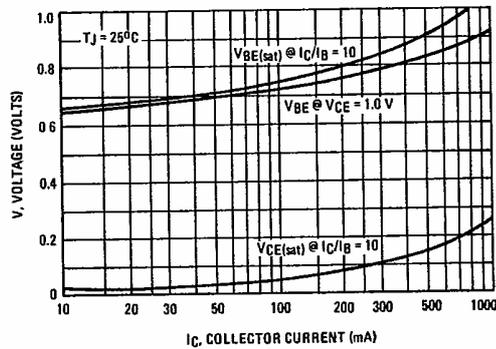
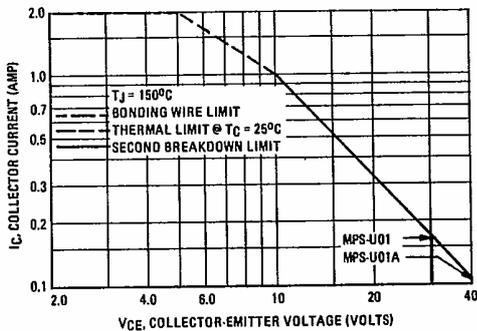


FIGURE 3 — DC SAFE OPERATING AREA



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 $T_{J(pk)} = 150^\circ\text{C}$; T_C 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.

3