



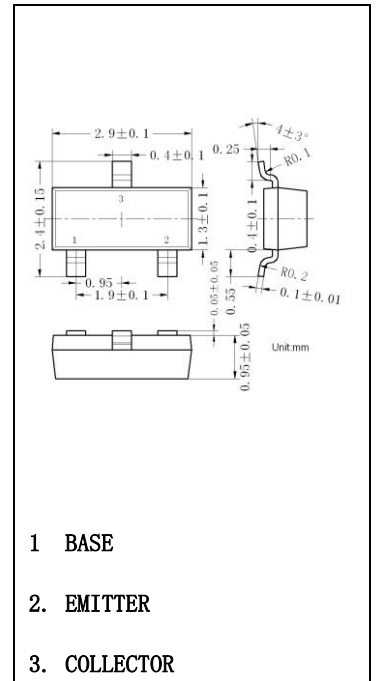
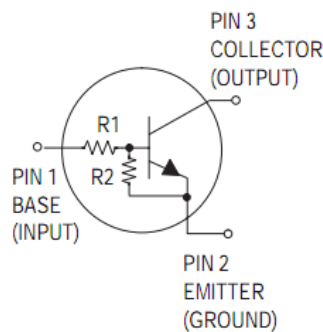
# SOT-23 Bias Resistor Transistors

## MMUN2211LT1 TRANSISTOR (NPN)

### NPN Silicon Surface Mount Transistor with Monolithic Bias Resistor Network

This new series of digital transistors is designed to replace a single device and its external resistor bias network. The BRT (Bias Resistor Transistor) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. The BRT eliminates these individual components by integrating them into a single device. The use of a BRT can reduce both system cost and board space. The device is housed in the SOT-23 package which is designed for low power surface mount applications.

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The SOT-23 package can be soldered using wave or reflow. The modified gull-winged leads absorb thermal stress during soldering eliminating the possibility of damage to the die.
- Available in 8 mm embossed tape and reel. Use the Device Number to order the 7 inch/3000 unit reel. Replace "T1" with "T3" in the Device Number to order the 13 inch/10,000 unit reel.



### MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage	50	V
$V_{CEO}$	Collector-Emitter Voltage	50	V
$I_C$	Collector Current	100	mA
$P_D$	Total Power Dissipation @ $T_A=25^\circ\text{C}$ Derate above $25^\circ\text{C}$	200	mW
		1.6	mW/ $^\circ\text{C}$

### THERMAL CHARACTERISTICS

Thermal Resistance — Junction-to-Ambient (surface mounted)	$R_{\theta JA}$	625	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$
Maximum Temperature for Soldering Purposes, Time in Solder Bath	$T_L$	260	$^\circ\text{C}$
		10	Sec

### DEVICE MARKING AND RESISTOR VALUES

Device	Marking	R1(K)	R2(K)
MMUN2211LT1	A8A	10	10

1. Device mounted on a FR-4 glass epoxy printed circuit board using the minimum recommended footprint.
2. New devices. Updated curves to follow in subsequent data sheets.

Thermal Clad is a trademark of the Bergquist Company

**Preferred** devices are Motorola recommended choices for future use and best overall value.

(Replaces MMUN2211T1/D)

**ELECTRICAL CHARACTERISTICS (T<sub>a</sub>=25°C unless otherwise specified)**

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> =10μA, I <sub>E</sub> =0	50			V
Collector-emitter breakdown voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> =2mA, I <sub>B</sub> =0	50			V
Collector-Base cut-off current	I <sub>CBO</sub>	V <sub>CB</sub> =50V, I <sub>E</sub> =0			100	nA
Collector-Emitter cut-off current	I <sub>CEO</sub>	V <sub>CE</sub> =50V, I <sub>B</sub> =0			500	nA
Emitter- Base cut-off current	I <sub>EBO</sub>	V <sub>EB</sub> =6V, I <sub>C</sub> =0			0.5	mA
DC current gain	h <sub>FE</sub>	V <sub>CE</sub> =10V, I <sub>C</sub> =5mA	35	60		
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> =10 mA, I <sub>B</sub> =0.3mA			0.25	V
Output voltage(on)	V <sub>OL</sub>	V <sub>CC</sub> =5V, V <sub>B</sub> =2.5V, R <sub>L</sub> =1.0KΩ			0.2	V
Output voltage(off)	V <sub>OH</sub>	V <sub>CC</sub> =5V, V <sub>B</sub> =0.5V, R <sub>L</sub> =1.0KΩ	4.9			V

**ELECTRICAL CHARACTERISTICS (T<sub>a</sub>=25°C unless otherwise specified)**

Characteristic	Symbol	Min	Typ	Max	Unit
Input resistor	R1	7.0	10	13	KΩ
Resistor ratio	R1/R2	0.8	1.0	1.2	

3. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%.

# Typical Characteristics

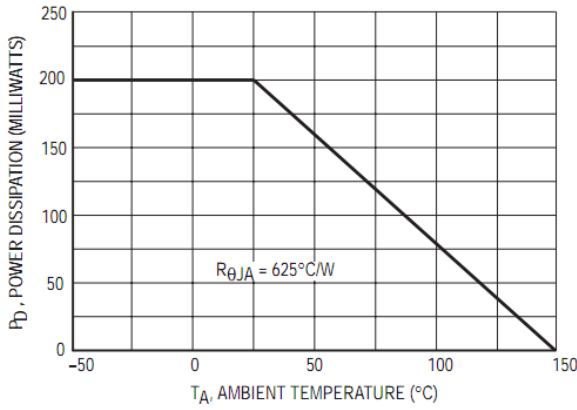


Figure 1. Derating Curve

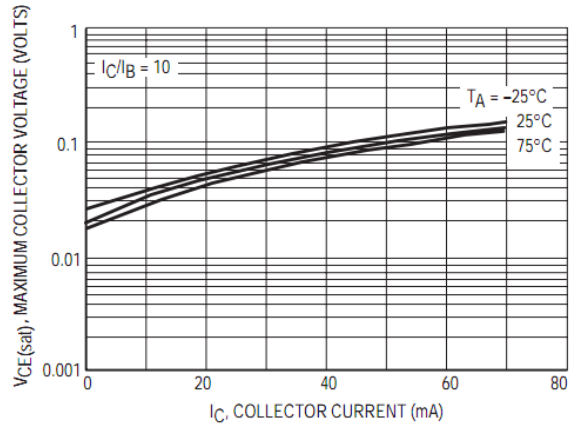


Figure 2. V<sub>CE(sat)</sub> versus I<sub>C</sub>

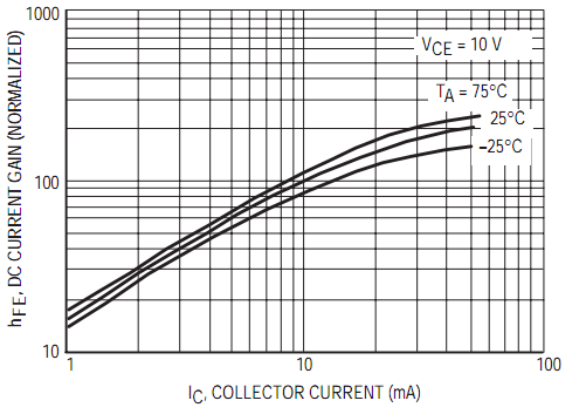


Figure 3. DC Current Gain

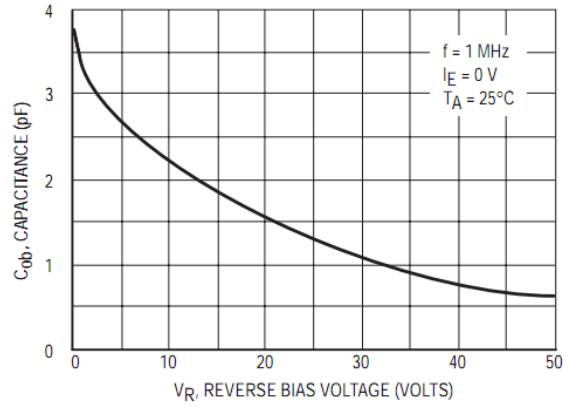


Figure 4. Output Capacitance

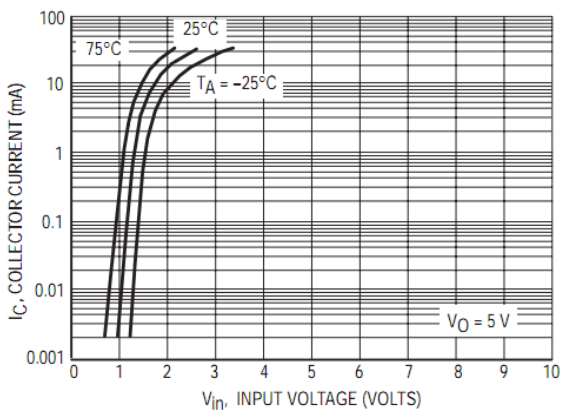


Figure 5. V<sub>CE(sat)</sub> versus I<sub>C</sub>

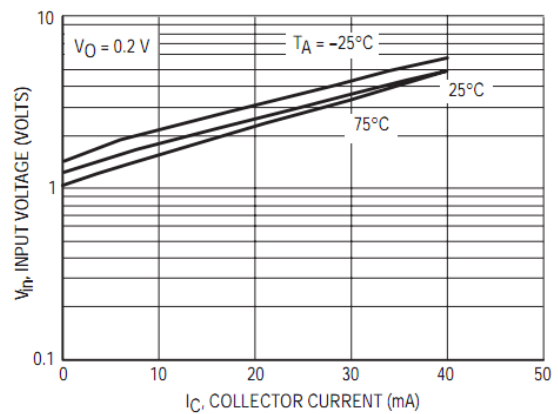


Figure 6. V<sub>CE(sat)</sub> versus I<sub>C</sub>