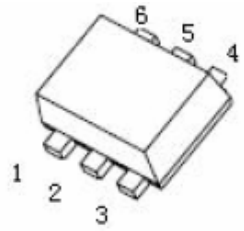
Dual Bias ResistorTransistors

PNP Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

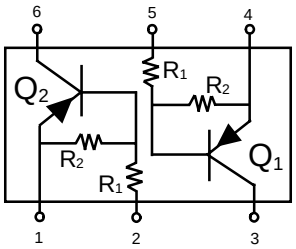
MMUN51xxV
- **Series**

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. These digital transistors are designed to replace a single device and its external resistor bias network. The BRT eliminates these individual components by integrating them into a single device. In the MMUN51xxV series, two BRT devices are housed in the SOT–563 package which is ideal for low power surface mount applications where board space is at a premium.

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- We declare that the material of product compliance with RoHS requirements.



SOT-563



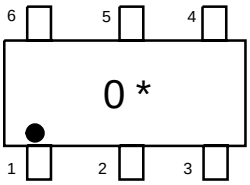
MAXIMUM RATINGS (T_A = 25°C unless otherwise noted, common for Q_1 and Q_2)

Rating	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-50	Vdc
Collector-Emitter Voltage	V_{CEO}	-50	Vdc
Collector Current	I_C	-100	mAdc

THERMAL CHARACTERISTICS

Characteristic (One Junction Heated)	Symbol	Max	Unit
Total Device Dissipation T_A = 25°C	P_D	150 (Note 1.) 256 (Note 2.)	mW
Derate above 25°C		1.5 (Note 1.) 2.0 (Note 2.)	mW/°C
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	833 (Note 1.) 490 (Note 2.)	°C/W
Characteristic (Both Junctions Heated)	**Symbol**	**Max**	**Unit**
Total Device Dissipation T_A = 25°C	P_D	250 (Note 1.) 385 (Note 2.)	mW
Derate above 25°C		2.0 (Note 1.) 3.0 (Note 2.)	mW/°C
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	493 (Note 1.) 325 (Note 2.)	°C/W
Thermal Resistance – Junction-to-Lead	$R_{\theta JL}$	188 (Note 1.) 208 (Note 2.)	°C/W
Junction and Storage Temperature	T_J, T_{stg}	–55 to +150	°C

MARKING DIAGRAM



7 * = Device Marking
(See Page 2)

DEVICE MARKING INFORMATION

See specific marking information in the device marking table on page 2 of this data sheet.

DEVICE MARKING , RESISTOR VALUES AND ORDERING INFORMATION

Device	Package	Marking	R1(K)	R2(K)	Shipping
MMUN5111V	SOT-563	0A	10	10	3000/Tape&Reel
MMUN5112V	SOT-563	0B	22	22	3000/Tape&Reel
MMUN5113V	SOT-563	0C	47	47	3000/Tape&Reel
MMUN5114V	SOT-563	0D	10	47	3000/Tape&Reel
MMUN5115V	SOT-563	0E	10	∞	3000/Tape&Reel
MMUN5116V	SOT-563	0F	4.7	∞	3000/Tape&Reel
MMUN5130V	SOT-563	0G	1	1	3000/Tape&Reel
MMUN5131V	SOT-563	0H	2.2	2.2	3000/Tape&Reel
MMUN5132V	SOT-563	0J	4.7	4.7	3000/Tape&Reel
MMUN5133V	SOT-563	0K	4.7	47	3000/Tape&Reel
MMUN5134V	SOT-563	0L	22	47	3000/Tape&Reel
MMUN5135V	SOT-563	0M	2.2	47	3000/Tape&Reel

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, common for Q_1 and Q_2,)(Continued)

Parameter		Symbol	Min.	Max.	Unit
DC Current Gain					
at V_{CE} = -10 V, I_C = -5 mA	MMUN5111V	h_{FE}	35	-	-
	MMUN5112V	h_{FE}	60	-	-
	MMUN5113V	h_{FE}	80	-	-
	MMUN5114V	h_{FE}	80	-	-
	MMUN5115V	h_{FE}	160	-	-
	MMUN5116V	h_{FE}	160	-	-
	MMUN5130V	h_{FE}	3	-	-
	MMUN5131V	h_{FE}	8	-	-
	MMUN5132V	h_{FE}	15	-	-
	MMUN5133V	h_{FE}	80	-	-
	MMUN5134V	h_{FE}	80	-	-
	MMUN5135V	h_{FE}	80	-	-
Collector Base Cutoff Current at V_{CB} = -50 V		I_{CBO}	-	-100	nA
Collector Emitter Cutoff Current at V_{CE} = -50 V		I_{CEO}	-	-500	nA
Emitter Base Cutoff Current					
at V_{EB} = -6 V	MMUN5111V	I_{EBO}	-	-0.5	mA
	MMUN5112V	I_{EBO}	-	-0.2	mA
	MMUN5113V	I_{EBO}	-	-0.1	mA
	MMUN5114V	I_{EBO}	-	-0.2	mA
	MMUN5115V	I_{EBO}	-	-0.9	mA
	MMUN5116V	I_{EBO}	-	-1.9	mA
	MMUN5130V	I_{EBO}	-	-4.3	mA
	MMUN5131V	I_{EBO}	-	-2.3	mA
	MMUN5132V	I_{EBO}	-	-1.5	mA
	MMUN5133V	I_{EBO}	-	-0.18	mA
	MMUN5134V	I_{EBO}	-	-0.13	mA
	MMUN5135V	I_{EBO}	-	-0.2	mA
Collector Base Breakdown Voltage at I_C = -10 µA		$V_{(BR)CBO}$	-50	-	V
Collector Emitter Breakdown Voltage at I_C = -2 mA		$V_{(BR)CEO}$	-50	-	V
Collector Emitter Saturation Voltage					
at I_C = -10 mA, I_B = -0.3 mA	MMUN5111V	V_{CEsat}	-	-0.25	V
	MMUN5112V	V_{CEsat}	-	-0.25	V
	MMUN5113V	V_{CEsat}	-	-0.25	V
	MMUN5114V	V_{CEsat}	-	-0.25	V
	MMUN5133V	V_{CEsat}	-	-0.25	V
at I_C = -10 mA, I_B = -5 mA	MMUN5130V	V_{CEsat}	-	-0.25	V
	MMUN5131V	V_{CEsat}	-	-0.25	V
at I_C = -10 mA, I_B = -1 mA	MMUN5115V	V_{CEsat}	-	-0.25	V
	MMUN5116V	V_{CEsat}	-	-0.25	V
	MMUN5132V	V_{CEsat}	-	-0.25	V
	MMUN5134V	V_{CEsat}	-	-0.25	V
	MMUN5135V	V_{CEsat}	-	-0.25	V

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, common for Q_1 and Q_2,)(Continued)

Parameter		Symbol	Min.	Max.	Unit
Output Voltage (on)					
at V_{CC} = -5 V, V_B = -2.5 V, R_L = 1 KΩ	MMUN5111V	V_{OL}	-	-0.2	V
	MMUN5112V	V_{OL}	-	-0.2	V
	MMUN5114V	V_{OL}	-	-0.2	V
	MMUN5115V	V_{OL}	-	-0.2	V
	MMUN5116V	V_{OL}	-	-0.2	V
	MMUN5130V	V_{OL}	-	-0.2	V
	MMUN5131V	V_{OL}	-	-0.2	V
	MMUN5132V	V_{OL}	-	-0.2	V
	MMUN5133V	V_{OL}	-	-0.2	V
	MMUN5134V	V_{OL}	-	-0.2	V
	MMUN5135V	V_{OL}	-	-0.2	V
at V_{CC} = -5 V, V_B = -3.5 V, R_L = 1 KΩ	MMUN5113V	V_{OL}	-	-0.2	V
Output Voltage (off)					
at V_{CC} = -5 V, V_B = -0.5 V, R_L = 1 KΩ	MMUN5111V	V_{OH}	4.9	-	V
	MMUN5112V	V_{OH}	4.9	-	V
	MMUN5113V	V_{OH}	4.9	-	V
	MMUN5114V	V_{OH}	4.9	-	V
	MMUN5133V	V_{OH}	4.9	-	V
	MMUN5134V	V_{OH}	4.9	-	V
	MMUN5135V	V_{OH}	4.9	-	V
at V_{CC} = -5 V, V_B = -0.05 V, R_L = 1 KΩ	MMUN5115V	V_{OH}	4.9	-	V
	MMUN5116V	V_{OH}	4.9	-	V
	MMUN5131V	V_{OH}	4.9	-	V
	MMUN5132V	V_{OH}	4.9	-	V
at V_{CC} = -5 V, V_B = -0.25 V, R_L = 1 KΩ	MMUN5130V	V_{OH}	4.9	-	V
Input Resistor	MMUN5111V	R1	7	13	KΩ
	MMUN5112V	R1	15.4	28.6	KΩ
	MMUN5113V	R1	32.9	61.1	KΩ
	MMUN5114V	R1	7	13	KΩ
	MMUN5115V	R1	7	13	KΩ
	MMUN5116V	R1	3.3	6.1	KΩ
	MMUN5130V	R1	0.7	1.3	KΩ
	MMUN5131V	R1	1.5	2.9	KΩ
	MMUN5132V	R1	3.3	6.1	KΩ
	MMUN5133V	R1	3.3	6.1	KΩ
	MMUN5134V	R1	15.4	28.6	KΩ
	MMUN5135V	R1	1.54	2.86	KΩ
Resistor Ratio	MMUN5111V/MMUN5112V/MMUN5113V	R1/R2	0.8	1.2	-
	MMUN5114V	R1/R2	0.17	0.25	-
	MMUN5115V/MMUN5116V	R1/R2	-	-	-
	MMUN5130V/MMUN5131V/MMUN5132V	R1/R2	0.8	1.2	-
	MMUN5133V	R1/R2	0.055	0.185	-
	MMUN5134V	R1/R2	0.38	0.56	-
	MMUN5135V	R1/R2	0.038	0.056	-

TYPICAL ELECTRICAL CHARACTERISTICS — MUN51xxV

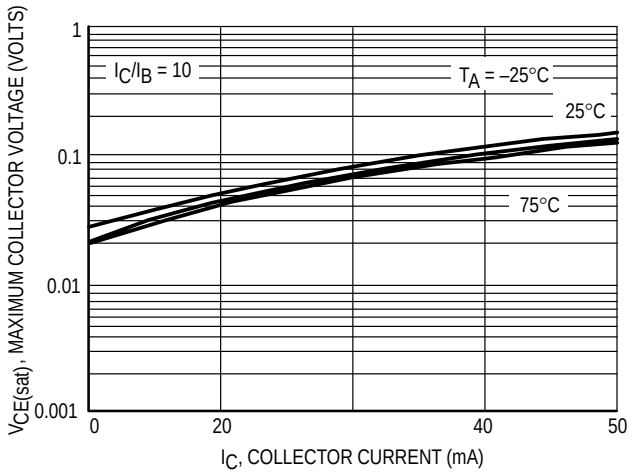


Figure 2. $V_{CE(sat)}$ versus I_C

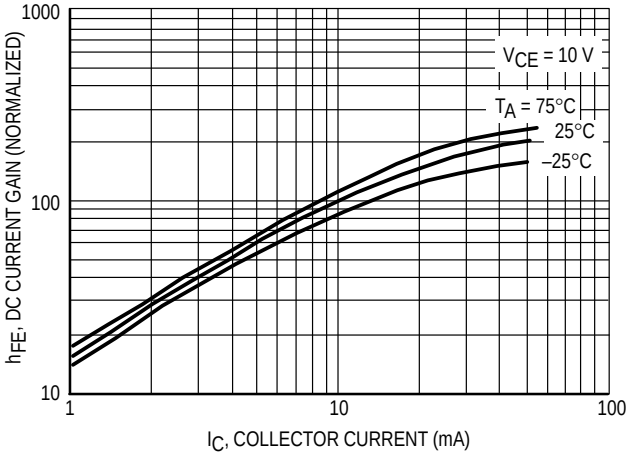


Figure 3. DC Current Gain

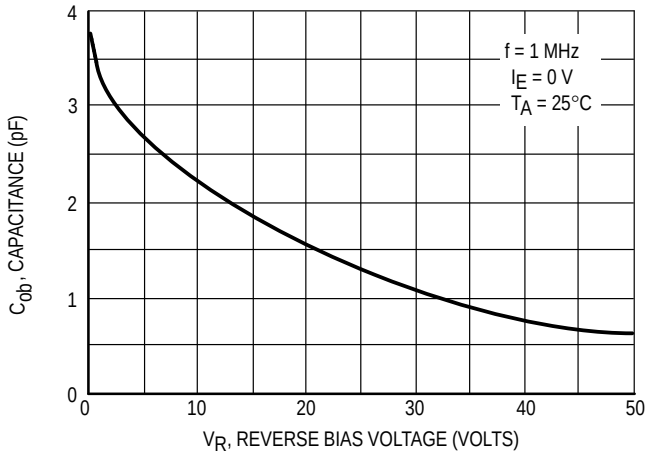


Figure 4. Output Capacitance

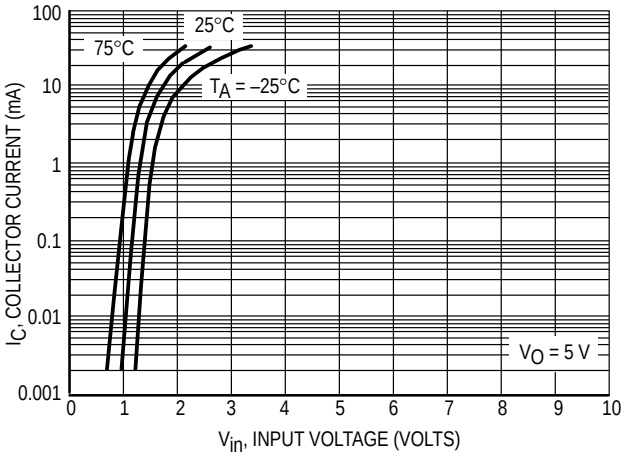


Figure 5. Output Current versus Input Voltage

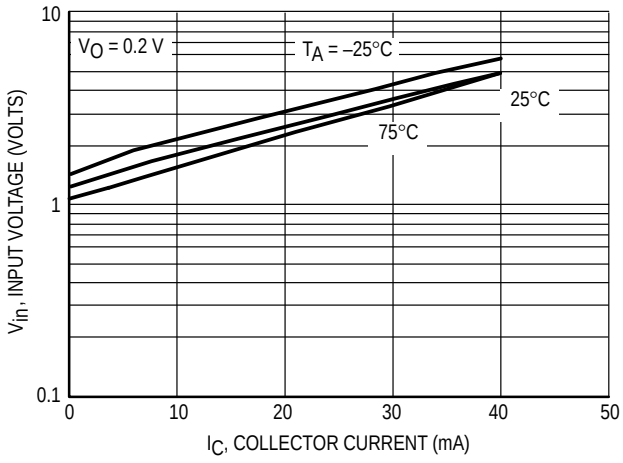


Figure 6. Input Voltage versus Output Current

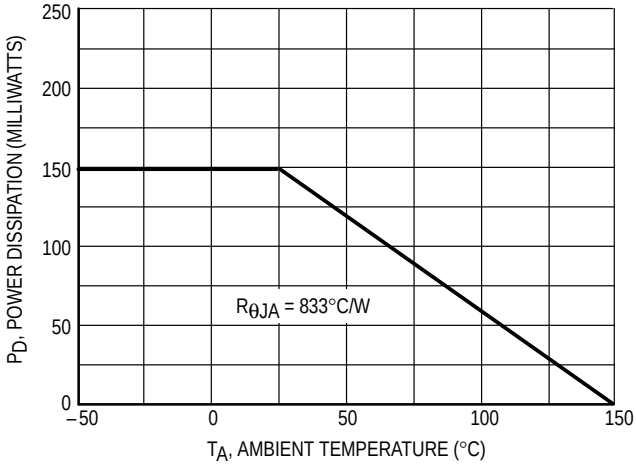


Figure 1. Derating Curve