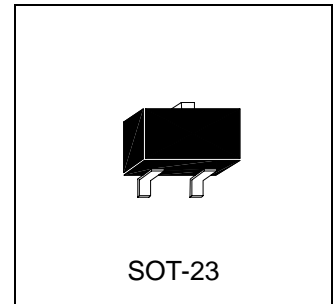




HUN2111 / HUN2112 / HUN2113 / HUN2114 / HUN2115 HUN2116 / HUN2130 / HUN2131 / HUN2132 / HUN2133 HUN2134 / HUN2136 / HUN2137 / HUN2140

PNP Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

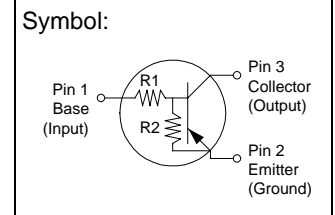


SOT-23

Description

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
 - Moisture Sensitivity Level: 1
 - ESD Rating: Human Body Model: Class1, Machine Model: Class B
 - The SOT-23 package can be soldered using wave or reflow.
 - Available in 8mm embossed tape and reel. Use the device number to order the 7 inch / 3,000 unit reel.
- The modified gull-winged leads absorb thermal stress during soldering eliminating the possibility of damage to the die.



Maximum Ratings (T_A=25°C unless otherwise noted)

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

Rating	Symbol	Value		Unit
		Note1	Note2	
Total Power Dissipation @ T _A =25°C Derate above 25°C	P _D	246 1.5	400 2.0	mW mW/°C
Thermal Resistance-Junction-to-Ambient	R _{θJA}	508	311	°C/W
Thermal Resistance-Junction-to-Lead	R _{θJL}	174	208	°C/W
Operating and Storage Temperature Range	T _J , T _{stg}	-65 to +150		°C

Note1: FR-4 @ Minimum Pad, Note2: FR-4 @ 1.0X1.0 inch Pad

Device Marking and Resistor Values

Device	Package	Marking	R1(K)	R2(K)	Shipping
HUN2111	SOT-23	A6A	10	10	3000/Tape & Reel
HUN2112	SOT-23	A6B	22	22	3000/Tape & Reel
HUN2113	SOT-23	A6C	47	47	3000/Tape & Reel
HUN2114	SOT-23	A6D	10	47	3000/Tape & Reel
HUN2115	SOT-23	A6E	10	∞	3000/Tape & Reel
HUN2116	SOT-23	A6F	4.7	∞	3000/Tape & Reel
HUN2130	SOT-23	A6G	1	1	3000/Tape & Reel
HUN2131	SOT-23	A6H	2.2	2.2	3000/Tape & Reel
HUN2132	SOT-23	A6J	4.7	4.7	3000/Tape & Reel
HUN2133	SOT-23	A6K	4.7	47	3000/Tape & Reel
HUN2134	SOT-23	A6L	22	47	3000/Tape & Reel
HUN2136	SOT-23	A6N	100	100	3000/Tape & Reel
HUN2137	SOT-23	A6P	47	22	3000/Tape & Reel
HUN2140	SOT-23	A6T	47	∞	3000/Tape & Reel



Electrical Characteristics (T_A=25°C unless otherwise noted)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
<i>Off Characteristics</i>					
Collector-Base Cutoff Current (V _{CB} =-50V, I _F =0)	I _{CBO}	-	-	-100	nAdc
Collector-Emitter Cutoff Current (V _{CE} =-50V, I _B =0)	I _{CEO}	-	-	-500	nAdc
Emitter-Base Cutoff Current (V _{EB} =-6V, I _C =0)	HUN2111	-	-	-0.5	mAdc
	HUN2112	-	-	-0.2	
	HUN2113	-	-	-0.1	
	HUN2114	-	-	-0.2	
	HUN2115	-	-	-0.9	
	HUN2116	-	-	-1.9	
	HUN2130	-	-	-4.3	
	HUN2131	-	-	-2.3	
	HUN2132	-	-	-1.5	
	HUN2133	-	-	-0.18	
	HUN2134	-	-	-0.13	
	HUN2136	-	-	-0.05	
	HUN2137	-	-	-0.13	
HUN2140	-	-	-0.20		
Collector-Base Breakdown Voltage (I _C =-10uA, I _F =0)	V _{(BR)CBO}	-50	-	-	Vdc
Collector-Emitter Breakdown Voltage (I _C =-2mA, I _B =0)	*V _{(BR)CEO}	-50	-	-	Vdc

**On Characteristics*

DC Current Gain (V _{CE} =-10V, I _C =-5mA)	HUN2111	hFE	35	60	-	
	HUN2112		60	100	-	
	HUN2113		80	140	-	
	HUN2114		80	140	-	
	HUN2115		160	250	-	
	HUN2116		160	250	-	
	HUN2130		3	5	-	
	HUN2131		8	15	-	
	HUN2132		15	27	-	
	HUN2133		80	140	-	
	HUN2134		80	130	-	
	HUN2136		80	150	-	
	HUN2137		80	140	-	
HUN2140	120	250	-			
Collector-Emitter Saturation Voltage (I _C =-10mA, I _B =-0.3mA) HUN2111/HUN2112/HUN2113/HUN2114 HUN2115/HUN2130/HUN2136/HUN2137 (I _C =-10mA, I _B =-5mA) HUN2131 (I _C =-10mA, I _B =-1mA) HUN2116/HUN2132/HUN2134/HUN2140	V _{CE(sat)}	-	-	-0.25	Vdc	
Output Voltage (on) (V _{CC} =-5V, V _B =-2.5V, R _L =1kΩ)	HUN2111	V _{OL}	-	-	-0.2	Vdc
	HUN2112		-	-	-0.2	
	HUN2114		-	-	-0.2	
	HUN2115		-	-	-0.2	
	HUN2116		-	-	-0.2	
	HUN2130		-	-	-0.2	
	HUN2131		-	-	-0.2	
	HUN2132		-	-	-0.2	
	HUN2133		-	-	-0.2	
	HUN2134		-	-	-0.2	
(V _{CC} =-5V, V _B =-3.5V, R _L =1kΩ)	HUN2113	-	-	-0.2		
	HUN2140	-	-	-0.2		
(V _{CC} =-5V, V _B =-5.5V, R _L =1kΩ)	HUN2136	-	-	-0.2		
(V _{CC} =-5V, V _B =-4.0V, R _L =1kΩ)	HUN2137	-	-	-0.2		

*Pulse Test: Pulse Width ≤300us, Duty Cycle ≤2%



Electrical Characteristics (T_A=25°C unless otherwise noted)

Characteristic	Symbol	Min.	Typ.	Max.	Unit	
<i>*On Characteristics</i>						
Output Voltage (off) (V _{CC} =-5V, V _B =-0.5V, R _L =1kΩ)	V _{OH}	-4.9	-	-	Vdc	
(V _{CC} =-5V, V _B =-0.25V, R _L =1kΩ)						
HUN2115						
HUN2116						
HUN2131						
(V _{CC} =-5V, V _B =-0.05V, R _L =1kΩ)	HUN2132					
HUN2140						
HUN2130						
Input Resistor	R ₁				kΩ	
						HUN2111
						HUN2112
						HUN2113
						HUN2114
						HUN2115
						HUN2116
						HUN2130
						HUN2131
						HUN2132
						HUN2133
						HUN2134
						HUN2136
						HUN2137
HUN2140						
Resistor Ratio HUN2111/HUN2112/HUN2113/HUN2136 HUN2114 HUN2115/HUN2116/HUN2140 HUN2130/HUN2131/HUN2132 HUN2133 HUN2134 HUN2137	R ₁ /R ₂					

*Pulse Test: Pulse Width ≤300us, Duty Cycle ≤2%



SOT-23 Dimension

Marking:

Series Code
(See Page 1)

Pb Free Mark
Pb-Free: "●" (Note)
Normal: None

Note: Pb-free product can distinguish by the green label or the extra description on the right side of the label.

Pin Style: 1.Base 2.Emitter 3.Collector

Material:

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	2.80	3.04
B	1.20	1.60
C	0.89	1.30
D	0.30	0.50
G	1.70	2.30
H	0.013	0.10
J	0.085	0.177
K	0.32	0.67
L	0.85	1.15
S	2.10	2.75
V	0.25	0.65

*: Typical, Unit: mm

3-Lead SOT-23 Plastic
Surface Mounted Package
HSMC Package Code: N

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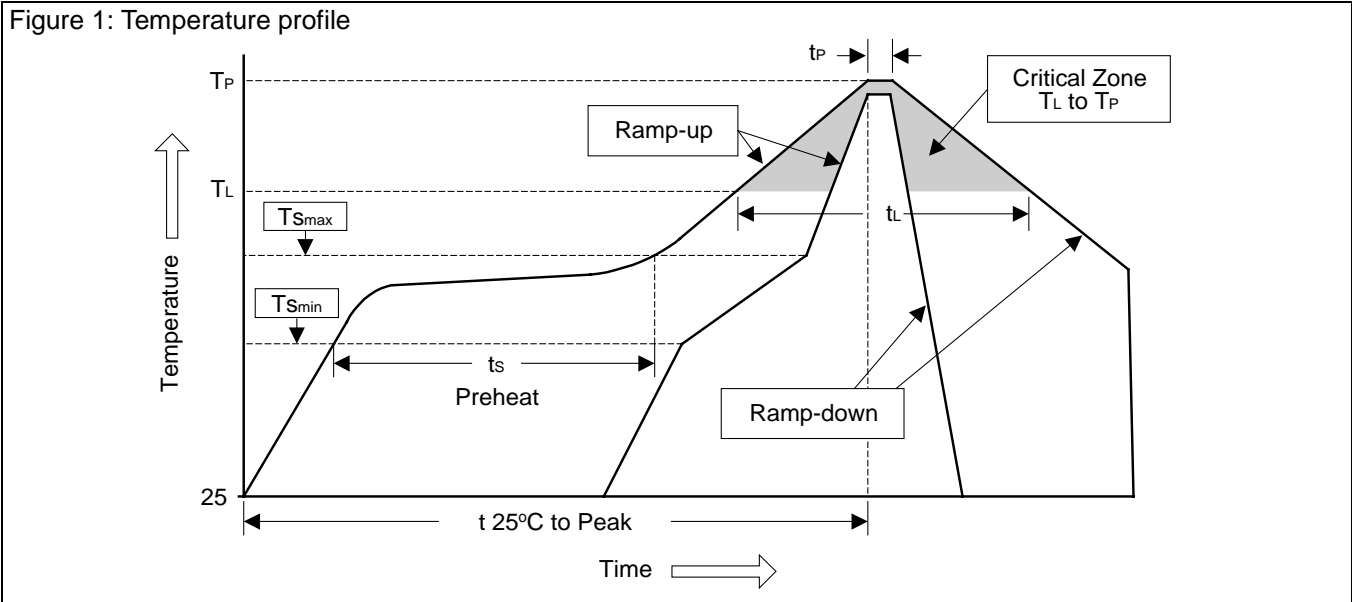
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Soldering Methods for HSMC's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T _L to T _p)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T _{smin})	100°C	150°C
- Temperature Max (T _{smax})	150°C	200°C
- Time (min to max) (ts)	60~120 sec	60~180 sec
T _{smax} to T _L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T _L)	183°C	217°C
- Time (t _L)	60~150 sec	60~150 sec
Peak Temperature (T _p)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t _p)	10~30 sec	20~40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec