2N2920AHR

Hi-Rel NPN dual matched bipolar transistor 60 V - 0.03 A

Features

BV_{CEO}	60 V
I_C (max)	0.03 A
H_{FE} at 10 V - 150 mA	> 300
Operating temperature range	-65°C to +200°C

- Hi-Rel NPN dual matched bipolar transistor
- Linear gain characteristics
- ESCC qualified
- European preferred part list - EPPL
- Radiation level: lot specific total dose contact marketing for specified level

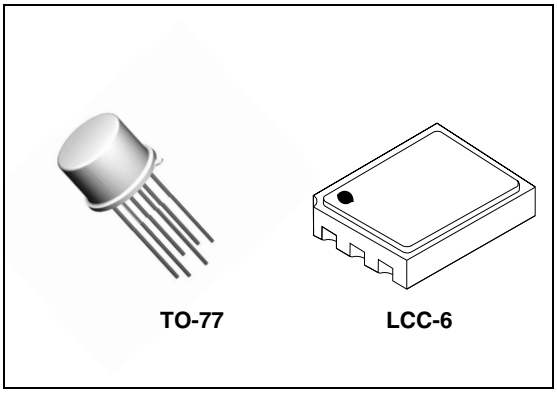
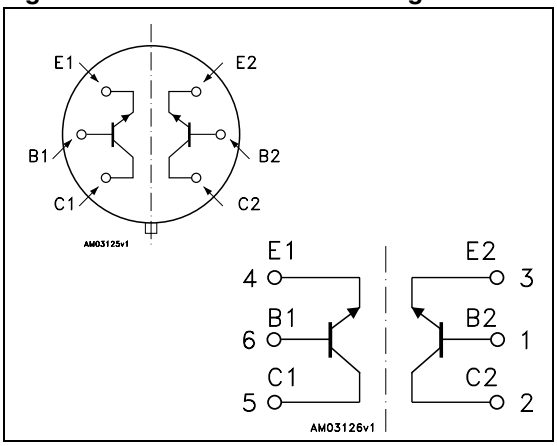


Figure 1. Internal schematic diagram



Description

The 2N2920AHR is a silicon planar epitaxial NPN transistor in TO-77 and LCC-6 packages. It is specifically designed for aerospace Hi-Rel applications and ESCC qualified according to the 5207-002 specification. In case of conflict between this datasheet and ESCC detailed specification, the latter prevails.

Table 1. Device summary

Order codes	Packages	Lead finish	Marking	Type	EPPL	Packaging
2N2920AHR	TO-77	Gold Solder Dip	520700203 520700206	ESCC Flight		Strip pack
2N2920AT1	TO-77	Gold	2N2920AT1	Engineering model		Strip pack
SOC2920A	LCC-6	Gold	SOC2920A	Engineering model		Waffle pack
SOC2920AHRB	LCC-6	Gold Solder Dip	520700212 520700215	ESCC Flight	Yes	Waffle pack

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage (I_E = 0)	60	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	60	V
V_{EBO}	Emitter-base voltage (I_C = 0)	6	V
I_C	Collector current	30	mA
P_{TOT}	Total dissipation at $T_{amb} \leq 25$ °C		
	for Root part number 1 (1)	0.3	W
	for Root part number 1 (2)	0.5	W
	for 2N2920AHR (1) (3)	0.6	W
	for 2N2920AHR (2) (3)	1	W
	Total dissipation at $T_c \leq 25$ °C		
	for Root part number 1 (1)	0.75	W
	for Root part number 1 (2)	1.25	W
T_{STG}	Storage temperature	-65 to 200	°C
T_J	Max. operating junction temperature	200	°C

1. One section.
2. Both sections.
3. When mounted on a 15 x 15 x 0.6 mm ceramic substrate.

Table 3. Thermal data for through-hole package

Symbol	Parameter		Value	Unit
R_{thJC}	Thermal resistance junction-case (1)	max	233	°C/W
	Thermal resistance junction-case (2)	max	140	°C/W
R_{thJA}	Thermal resistance junction-ambient (1)	max	583	°C/W
	Thermal resistance junction-ambient (2)	max	350	°C/W

1. One section.
2. Both sections.

Table 4. Thermal data for SMD package

Symbol	Parameter		Value	Unit
R_{thJA}	Thermal resistance junction-ambient (1)(3)	max	291	°C/W
	Thermal resistance junction-ambient (2)(3)	max	175	°C/W

1. One section.
2. Both sections.
3. When mounted on a 15 x 15 x 0.6 mm ceramic substrate.

2 Electrical characteristics

T_{case} = 25 °C unless otherwise specified

Table 5. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector-base cut-off current (I_E = 0)	V_{CB} = 45 V V_{CB} = 45 V T_C = 150 °C			2 10	nA µA
I_{CEO}	Collector cut-off current (I_B = 0)	V_{CE} = 5 V			2	nA
I_{EBO}	Emitter-base cut-off current (I_C = 0)	V_{EB} = 5 V			2	nA
$V_{(BR)CBO}$	Collector-base breakdown voltage (I_E = 0)	I_C = 10 µA	60			V
$V_{(BR)CEO}$ (1)	Collector-emitter breakdown voltage (I_B = 0)	I_C = 10 mA	60			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 10 µA	6			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 1 mA I_B = 0.1 mA			0.35	V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 1 mA I_B = 0.1 mA	0.5		1	V
h_{FE} (1)	DC current gain	I_C = 10 µA V_{CE} = 5 V I_C = 100 µA V_{CE} = 5 V I_C = 1 mA V_{CE} = 5 V I_C = 10 µA V_{CE} = 5 V T_{amb} = -55 °C	150 225 300 50		600	
h_{FE2-1} / h_{FE2-2}	DC current transfer ratio comparison	I_C = 100 µA V_{CE} = 5 V T_{amb} = -55 °C to +25 °C	0.91		1.1	
h_{FE2-1} / h_{FE2-2}	DC current transfer ratio comparison	I_C = 100 µA V_{CE} = 5 V T_{amb} = -55 °C to +125 °C	0.85		1.18	
$\Delta \lvert V_{BE1} - V_{BE2} \rvert$	Base-emitter voltage differential	V_{CE} = 5 V I_C = 10 µA V_{CE} = 5 V I_C = 100 µA V_{CE} = 5 V I_C = 1 mA			2 1.5 2	mV mV mV
$\Delta \lvert V_{BE1} - V_{BE2} \rvert$	Base-emitter voltage differential	V_{CE} = 5 V I_C = 100 µA T_{amb} = -55 °C to +25 °C T_{amb} = +25 °C to +125 °C			 0.4 0.5	 mV mV
I_{Lk}	Leakage current between active devices	V = 50 V to E_2, B_2, C_2 V = 0 V to E_1, B_1, C_1			5	µA
f_T	Transition frequency	I_C = 0.5 mA V_{CE} = 5 V	60			MHz

Table 5. Electrical characteristics (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
h_{ob}	Output admittance	V_{CE} = 5 V I_C = 1 mA f = 1 kHz			1	µmho
h_{ib}	Input impedance	V_{CB} = 5 V I_C = 1 mA f = 1 kHz	25		32	W
C_{obo}	Output capacitance (I_E = 0)	V_{CB} = 5 V 100 kHz ≤ f ≤ 1 MHz			6	pF
NF	Noise figure	V_{CE} = 5 V I_C = 10 µA R_S = 10 kΩ f = 1 kHz Bandwidth = 200 Hz			3	dB
NF	Noise figure	V_{CE} = 5 V I_C = 10 µA R_S = 10 kΩ 10 Hz ≤ f ≤ 15.7 kHz Bandwidth = 200 Hz			3	dB

1. Pulsed duration = 300 µs, duty cycle ≤ 1.5%

3 Package mechanical data

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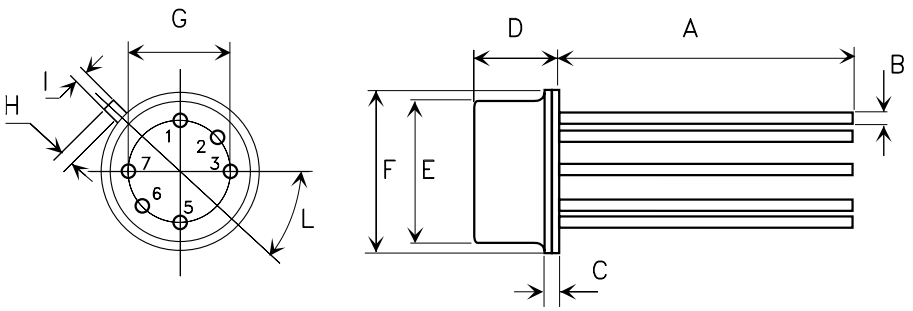
TO-77 mechanical data

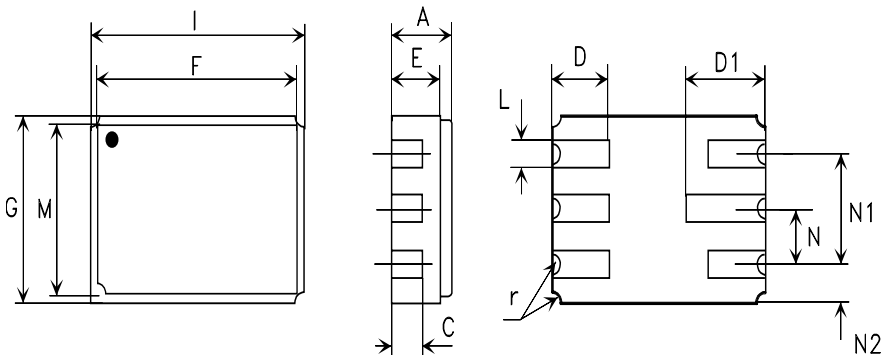
Dim.	mm		
	Min	Typ	Max
A	12.70		14.20
B			0.47
C	0.55		0.76
D			6.60
E			8.51
F			9.40
G		5.08	
H			1.14
I			1.00
L		45 °	



0015959E

Ceramic Leadless Chip Carrier 6 mechanical data

DIM.	mm.		
	MIN.	TYP	MAX.
A	1.53		1.96
C	0.78	0.89	0.99
D		1.65	
D1		2.28	
E		1.40	
F	5.75		5.95
G	4.15		4.50
I	6.05		6.30
L		0.63	
M	3.85		4.05
N		1.27	
N1		2.54	
N2		0.89	
r		0.23	



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4 Revision history

Table 6. Document revision history

Date	Revision	Changes
10-Dec-2008	1	Initial release
05-Jan-2010	2	Modified *Table 1 on page 1*

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