



2N5401HR

Hi-Rel PNP bipolar transistor 150 V - 0.5 A

Features

BV_{CEO}	150 V
I_C (max)	0.5 A
H_{FE} at 10 V - 150 mA	> 60
Operating temperature range	-65°C to +200°C

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

Description

The 2N5401HR is a silicon planar epitaxial PNP transistor in TO-18 and LCC-3 packages. It is specifically designed for aerospace Hi-Rel applications and ESCC qualified according to the 5202-014 specification. In case of conflict between this datasheet and ESCC detailed specification, the latter prevails.

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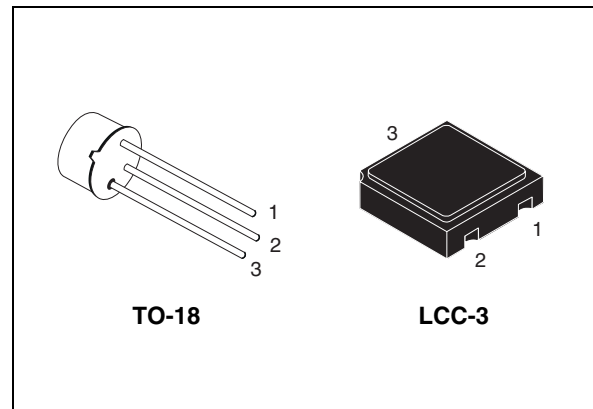


Figure 1. Internal schematic diagram

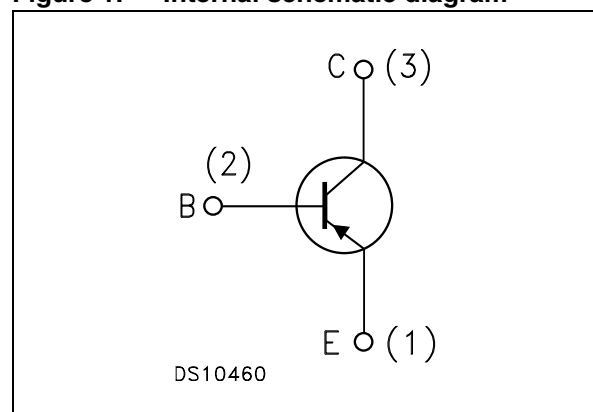


Table 1. Device summary

Order codes	Packages	Lead finish	Marking	Type	EPPL	Packaging
2N5401HR	TO-18	Gold Solder Dip	520201401 520201402	ESCC Flight		Strip pack
2N5401T1	TO-18	Gold	2N5401T1	Engineering model		Strip pack
SOC5401	LCC-3	Gold	SOC5401	Engineering model		Waffle pack
SOC5401HRB	LCC-3	Gold Solder Dip	520201404 520201405	ESCC Flight	Yes	Waffle pack

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage ($I_E = 0$)	-160	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	-150	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	-5	V
I_C	Collector current for 2N5401HR	-0.6	A
	for SOC5401HRB	-0.5	A
P_{TOT}	Total dissipation at $T_{amb} \leq 25\text{ °C}$ for 2N5401HR	0.36	W
	for SOC5401HRB	0.36	W
	for SOC5401HRB ⁽¹⁾	0.58	W
	Total dissipation at $T_c \leq 25\text{ °C}$ for 2N5401HR	1.2	W
T_{STG}	Storage temperature	-65 to 200	°C
T_J	Max. operating junction temperature	200	°C

1. When mounted on a 8x10x0.6 mm ceramic substrate.

Table 3. Thermal data for through-hole package

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max	146	°C/W
R_{thJA}	Thermal resistance junction-ambient max	486	°C/W

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Table 4. Thermal data for SMD package

Symbol	Parameter	Value	Unit
R_{thJA}	Thermal resistance junction-ambient max	486	°C/W
	Thermal resistance junction-ambient ⁽¹⁾ max	302	°C/W

1. When mounted on a 8x10x0.6 mm ceramic substrate.

2 Electrical characteristics

$T_{\text{case}} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Table 5. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector-base cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CB}} = -120\text{ V}$ $V_{\text{CB}} = -120\text{ V}$ $T_{\text{C}} = 150\text{ }^{\circ}\text{C}$			-50 -50	nA μA
I_{EBO}	Emitter-base cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = -3\text{ V}$			-50	nA
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ($I_{\text{E}} = 0$)	$I_{\text{C}} = -100\text{ }\mu\text{A}$	-160			V
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = -1\text{ mA}$	-150			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ($I_{\text{C}} = 0$)	$I_{\text{E}} = -10\text{ }\mu\text{A}$	-5			V
$V_{\text{CE}(\text{sat})}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = -10\text{ mA}$ $I_{\text{B}} = -1\text{ mA}$ $I_{\text{C}} = -50\text{ mA}$ $I_{\text{B}} = -5\text{ mA}$			-0.2 -0.5	V V
$V_{\text{BE}(\text{sat})}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = -10\text{ mA}$ $I_{\text{B}} = -1\text{ mA}$ $I_{\text{C}} = -50\text{ mA}$ $I_{\text{B}} = -5\text{ mA}$			-1 -1	V V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = -1\text{ mA}$ $V_{\text{CE}} = -5\text{ V}$ $I_{\text{C}} = -10\text{ mA}$ $V_{\text{CE}} = -5\text{ V}$ $I_{\text{C}} = -50\text{ mA}$ $V_{\text{CE}} = -5\text{ V}$ $I_{\text{C}} = -10\text{ mA}$ $V_{\text{CE}} = -5\text{ V}$ $T_{\text{amb}} = -55\text{ }^{\circ}\text{C}$	50 60 60 20		240	
h_{fe}	Small signal current gain	$V_{\text{CE}} = -10\text{ V}$ $I_{\text{C}} = -10\text{ mA}$ $f = 10\text{ kHz}$	5			
C_{obo}	Output capacitance ($I_{\text{E}} = 0$)	$V_{\text{CB}} = -10\text{ V}$ $f = 1\text{ MHz}$			6	pF

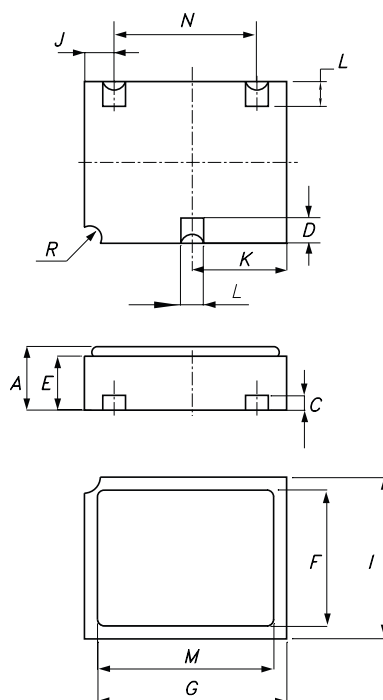
1. Pulsed duration = 300 μs , duty cycle $\leq 2\%$

3 Package mechanical data

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Ceramic Leadless Chip Carrier 3 mechanical data

DIM.	mm.		
	MIN.	TYP	MAX.
A	1.16		1.42
C	0.45	0.50	0.56
D		0.76	
E		1	
F	1.90		2.15
G	2.90		3.25
I	2.40		2.74
J	0.40	0.57	0.80
K	1.35	1.52	1.75
L		0.50	
M	2.40		2.65
N		1.90	
R		0.30	



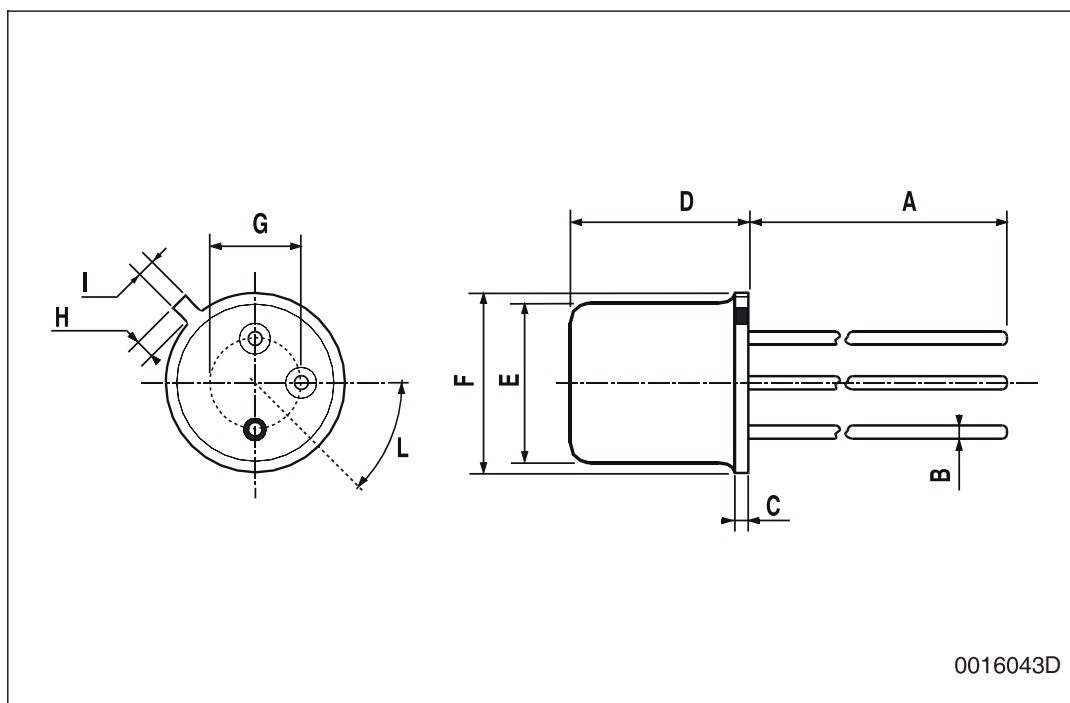
0041211J

Package mechanical data

2N5401HR

TO-18 Mechanical data

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		12.7			0.500	
B			0.49			0.019
D			5.3			0.208
E			4.9			0.193
F			5.8			0.228
G	2.54			0.100		
H			1.2			0.047
I			1.16			0.045
L	45°			45°		



4 Revision history

Table 6. Document revision history

Date	Revision	Changes
04-Jan-2010	1	Initial release

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