2N5154HR

Hi-Rel NPN bipolar transistor 80 V - 5 A

Datasheet – production data

Features

BV_{CEO}	80 V
I_C (max)	5 A
H_{FE} at 10 V - 150 mA	> 70
Operating temperature range	- 65 °C to + 200 °C

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

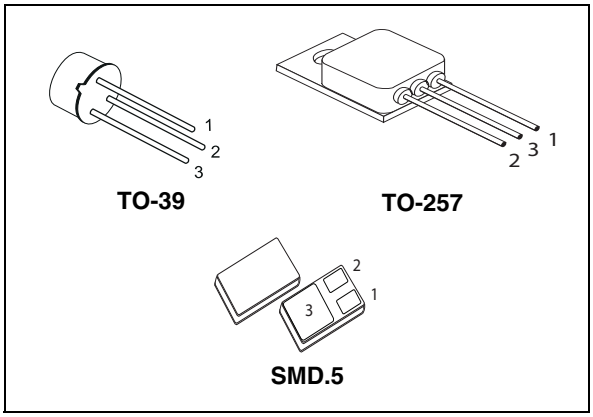
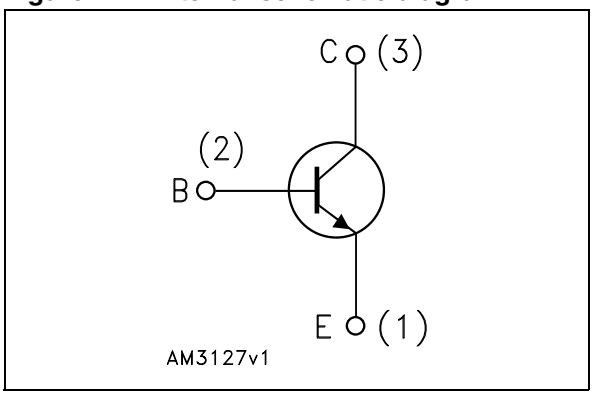


Figure 1. Internal schematic diagram



Description

The 2N5154HR is a silicon planar epitaxial NPN transistor in TO-39, TO-257 and SMD.5 packages. It is specifically designed for aerospace Hi-Rel applications and ESCC qualified according to the 5203-010 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
2N5154HR	TO-39	Gold Solder Dip	520301001 520301002	ESCC Flight		Strip pack
2N5154SHR	SMD.5	Gold	520301006	ESCC Flight	Yes	Strip pack
2N5154ESYHRB	TO-257	Gold Solder Dip	520301004 520301005	ESCC Flight		Strip pack
2N5154T1	TO-39	Gold	2N5154T1	Engineering model		Strip pack
2N5154S1	SMD.5	Gold	2N5154S1	Engineering model		Strip pack
2N5154ESY	TO-257	Gold	2N5154ESY	Engineering model		Strip pack

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage (I_E = 0)	100	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	80	V
V_{EBO}	Emitter-base voltage (I_C = 0)	6	V
I_C	Collector current	5	A
P_{TOT}	Total dissipation at $T_{amb} \leq 25$ °C		
	for 2N5154HR	1	W
	for 2N5154ESYHRB	3.3	W
	for 2N5154SHR	3.3	W
	$T_C \leq 25$ °C		
	for 2N5154HR	8.75	W
	for 2N5154ESYHRB	35	W
	for 2N5154SHR	35	W
T_{STG}	Storage temperature	- 65 to 200	°C
T_J	Max. operating junction temperature	200	°C

Table 3. Thermal data for through-hole packages

Symbol	Parameter		TO-39	TO-257	Unit
R_{thJC}	Thermal resistance junction-case	max	20	5	°C/W
R_{thJA}	Thermal resistance junction-ambient	max	175	53	

Table 4. Thermal data for SMD package

Symbol	Parameter		SMD.5	Unit
R_{thJC}	Thermal resistance junction-case	max	5	°C/W

2 Electrical characteristics

T_{case} = 25 °C unless otherwise specified.

Table 5. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current (I_E = 0)	V_{CB} = 60 V V_{CB} = 60 V T_{amb} = 150 °C			1 10	µA µA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 5 V V_{EB} = 6 V			1 1	µA mA
I_{CEO}	Collector cut-off current (I_B = 0)	V_{CE} = 40 V			50	µA
$V_{(BR)CEO}$ (1)	Collector-emitter breakdown voltage (I_B = 0)	I_C = 100 mA	80			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 5 A I_B = 0.5 A I_C = 2.5 A I_B = 250 mA			1.5 1.45	V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 2.5 A I_B = 0.25 A I_C = 5 A I_B = 0.5 A			1.45 2.2	V V
h_{FE} (1)	DC current gain	I_C = 50 mA V_{CE} = 5 V I_C = 2.5 A V_{CE} = 5 V I_C = 5 A V_{CE} = 5 V I_C = 2.5 A V_{CE} = 5 V T_{amb} = - 55 °C	50 70 40 35		200	
h_{fe}	AC forward current transfer ratio	V_{CE} = 5 V I_C = 500 mA f = 20 MHz	3.5			
C_{OBO}	Output capacitance	I_E = 0 V_{CB} = 10 V f = 1 MHz			250	pF
t_{on}	Turn-on time	V_{CC} = 30 V V_{BB} = 4 V $V_{in} \cong$ 51 V I_C = 5 A I_{B1} = - I_{B2} = 0.5 A			0.5	µs
t_{off}	Turn-off time	V_{CC} = 30 V V_{BB} = 4 V $V_{in} \cong$ 51 V I_C = 5 A I_{B1} = - I_{B2} = 0.5 A			1.3	µs

1. Pulsed duration = 300 µs, duty cycle ≤ 2%

2.1 Electrical characteristics (curves)

Figure 2. h_{FE} @V_{CE} = 5 V

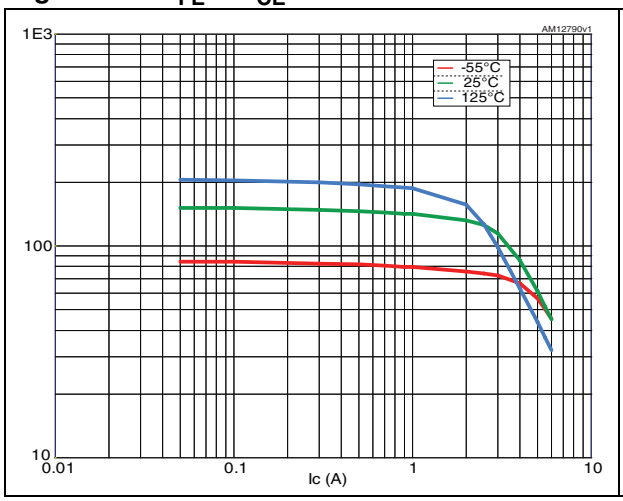


Figure 3. V_{CEsat} @ h_{FE} = 10

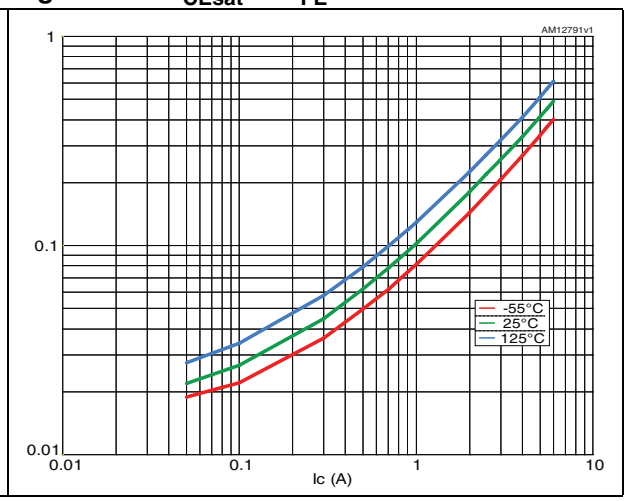


Figure 4. V_{BEsat} @ h_{FE} = 10

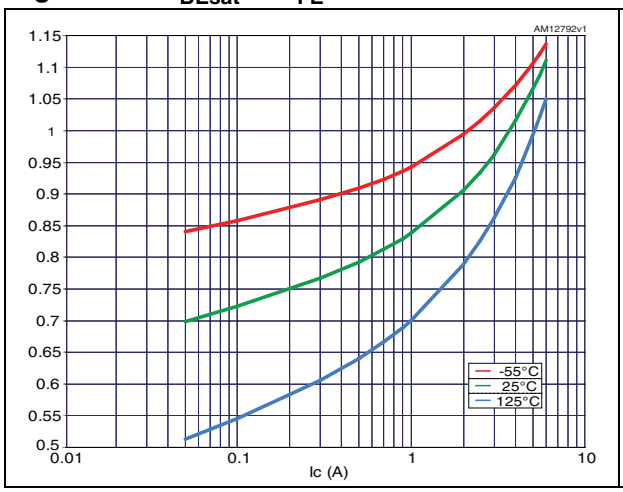
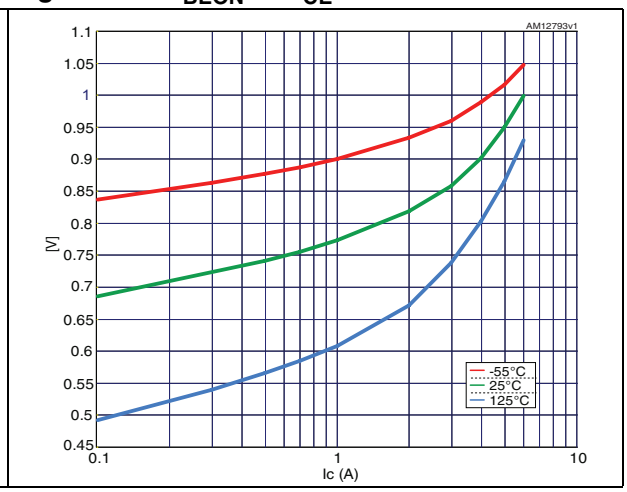
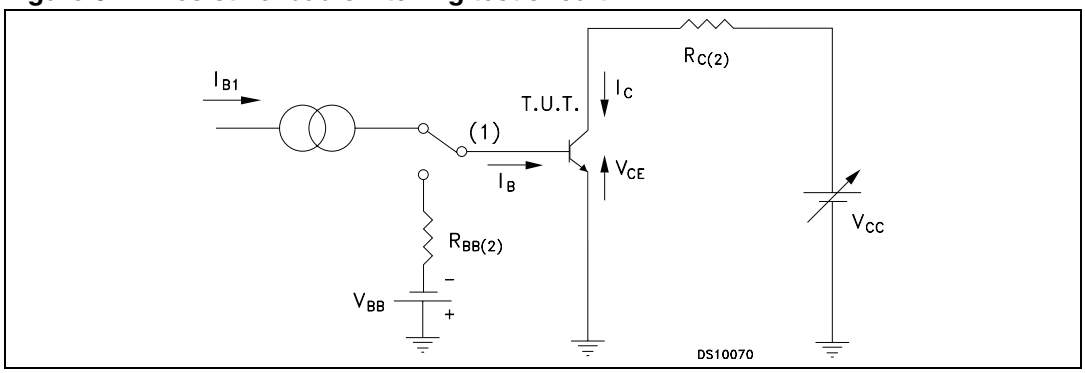


Figure 5. V_{BEON} @ V_{CE} = 5 V



2.2 Test circuit

Figure 6. Resistive load switching test circuit



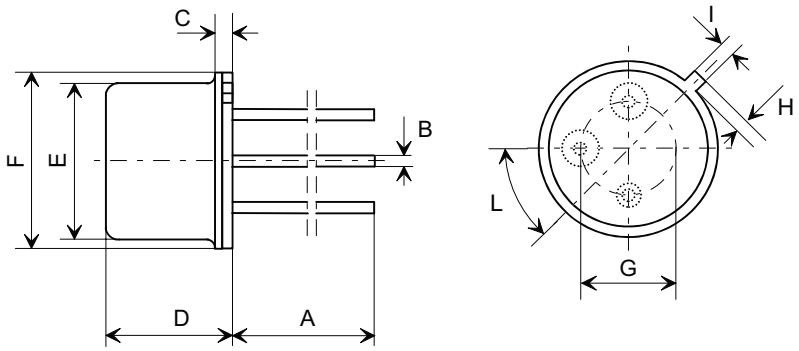
1. Fast electronic switch
2. Non-inductive resistor

3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

TO-39 mechanical data

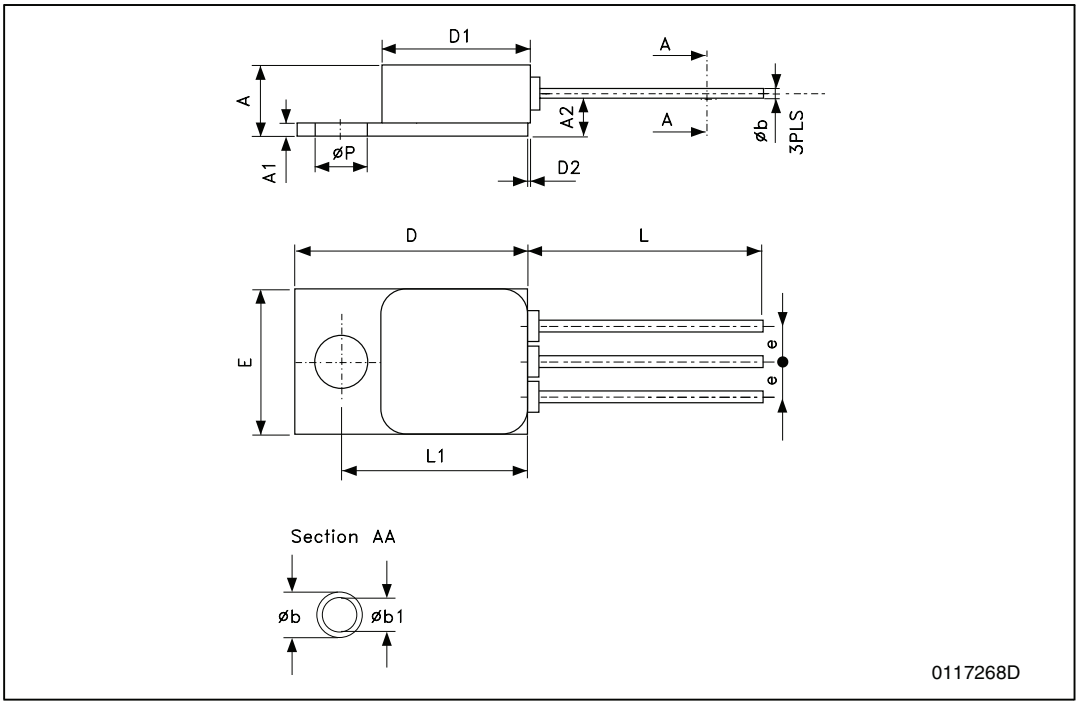
DIM.	mm.		
	Min.	Typ.	Max.
A	12.70		
B			0.49
D			6.60
E			8.51
F			9.40
G		5.08	
H			1.02
I			0.86
L		45°	



7012939_D

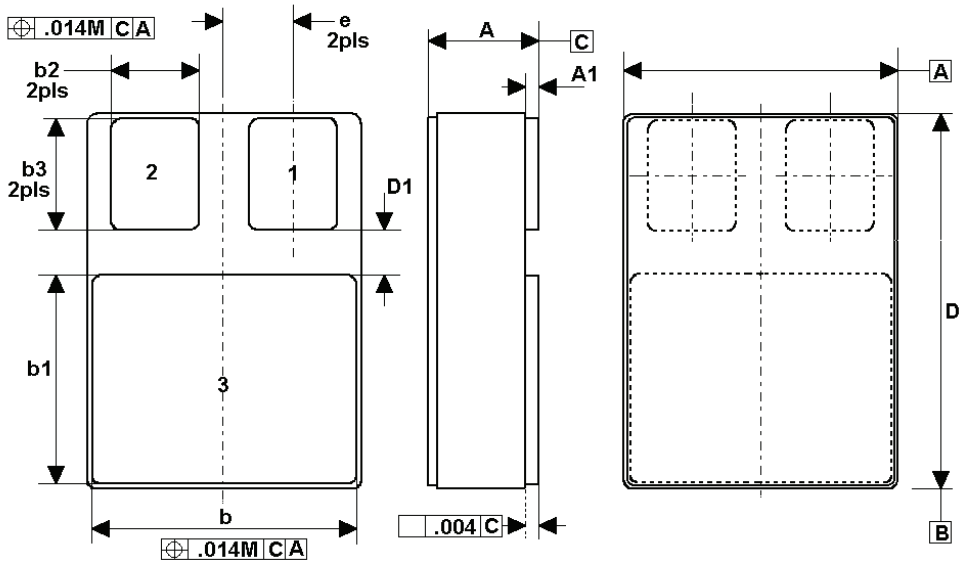
TO-257 mechanical data

DIM.	mm.		
	Min.	Typ.	Max.
A	4.83		5.08
A1	0.89		1.14
A2		3.05	
b	0.64		1.02
b1	0.64	0.76	0.89
D	16.38		16.89
D1	10.41		10.92
D2			0.97
e		2.54	
E	10.41		10.67
L	12.70		19.05
L1	13.39		13.64
P	3.56		3.81



SMD.5 mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	2.84	3.00	3.15
A1	0.25	0.38	0.51
b	7.13	7.26	7.39
b1	5.58	5.72	5.84
b2	2.28	2.41	2.54
b3	2.92	3.05	3.18
D	10.03	10.16	10.28
D1		0.76	
E	7.39	7.52	7.64
e		1.91	



4 Revision history

Table 6. Document revision history

Date	Revision	Changes
08-Jan-2009	1	Initial release
08-Jan-2010	2	Modified *Table 1 on page 1*
22-Jul-2011	3	Updated marking for the order code 2N5154ESYHRB in *Table 1 on page 1*
12-Sep-2012	4	Added: *Section 2.1: Electrical characteristics (curves) on page 4*