

Features

Parameter	Value
BV_{CEO}	60 V
I_C (max)	0.6 A
H_{FE} at 10 V - 150 mA	> 100

- Linear gain characteristics
- Hermetic packages
- ESCC and JANS qualified
- European preferred part list EPPL

Description

The 2N2907AHR is a silicon planar PNP transistor specifically designed and housed in hermetic packages for aerospace and Hi-Rel applications. It is available in the JAN qualification system (MIL-PRF19500 compliance) and in the ESCC qualification system (ESCC 5000 compliance). In case of discrepancies between this datasheet and the relevant agency specification, the latter takes precedence.

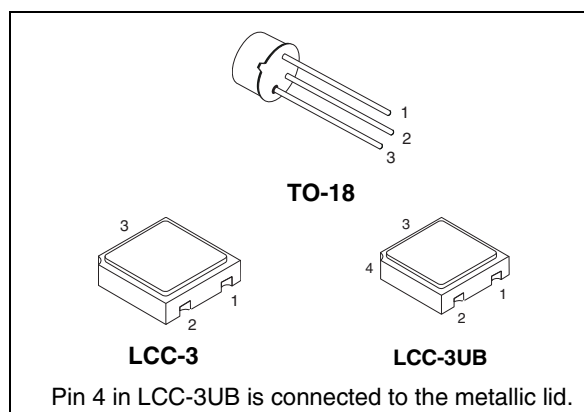


Figure 1. Internal schematic diagram

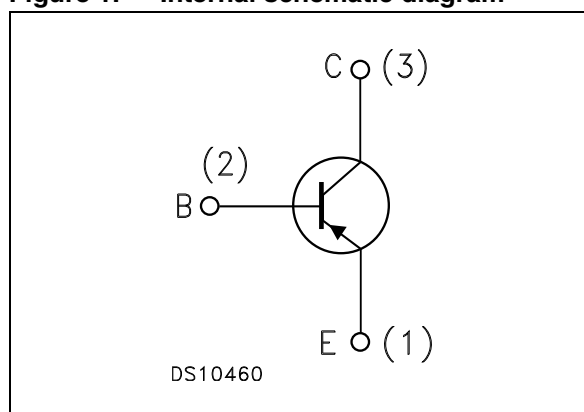


Table 1. Device summary⁽¹⁾

Order codes	Qualification	Agency spec.	Package	Radiation level	EPPL
JANS2N2907A	JANS	MIL-PRF-19500/291	LCC-3UB	-	-
2N2907AUB	ESCC	5201/001	LCC-3UB		Yes
SOC2907A			LCC-3		Yes
2N2907AHR			TO-18		-

1. Contact ST sales office for information about the specific conditions for products in die form and other JAN quality levels.

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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 ($I_C = 0$)	-5	V
I_C	Collector current for TO-18 for LCC-3 and LCC-3UB	-0.6 -0.5	A A
P_{TOT}	Total dissipation at $T_{amb} \leq 25^\circ\text{C}$ ESCC: TO-18	0.4	W
	LCC-3 and LCC-3UB	0.4	
	LCC-3 and LCC-3UB ⁽¹⁾	0.73	
	JANS: LCC-3UB	0.5	
	Total dissipation at $T_{case} \leq 25^\circ\text{C}$ ESCC: TO-18	1.8	
	Total dissipation at $T_{sp(1S)} = 25^\circ\text{C}$ JANS: LCC-3UB	1	
T_{stg}	Storage temperature	-65 to 200	$^\circ\text{C}$
T_J	Max. operating junction temperature	200	$^\circ\text{C}$

1. When mounted on a 15 x 15 x 0.6 mm ceramic substrate.

Table 3. Thermal data

Symbol	Parameter	LCC-3 LCC-3UB	TO-18	Unit
R_{thJC}	Thermal resistance junction-case (max) for JANS	-	-	$^\circ\text{C/W}$
	Thermal resistance junction-case (max) for ESCC	-	97	
$R_{thJSP(1S)}$	Thermal resistance junction-solder pad (infinite sink) (max) for JANS	90	-	
	Thermal resistance junction-solder pad (infinite sink) (max) for ESCC	-	-	
R_{thJA}	Thermal resistance junction-ambient (max) for JANS	325	-	
	Thermal resistance junction-ambient (max) for ESCC	437 240 ⁽¹⁾	437	

1. When mounted on a 15 x 15 x 0.6 mm ceramic substrate.

2 Electrical characteristics^(a)

JANS and ESCC version of the products are assembled and tested in compliance with the agency specification it is qualified in. The electrical characteristics of each version are provided in dedicated tables.

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

2.1 JANS electrical characteristics

Table 4. JANS electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CB}} = 60\text{ V}$ $V_{\text{CB}} = 50\text{ V}$ $V_{\text{CB}} = 50\text{ V}$ $T_{\text{amb}} = 150\text{ °C}$		-	10 10 10	μA nA μA
I_{CES}	Collector cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CE}} = 50\text{ V}$		-	50	nA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 5\text{ V}$ $V_{\text{EB}} = 4\text{ V}$		-	10 50	μA nA
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 10\text{ mA}$	60	-		V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 150\text{ mA}$ $I_{\text{B}} = 15\text{ mA}$ $I_{\text{C}} = 500\text{ mA}$ $I_{\text{B}} = 50\text{ mA}$		-	0.4 1.6	V V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 150\text{ mA}$ $I_{\text{B}} = 15\text{ mA}$ $I_{\text{C}} = 500\text{ mA}$ $I_{\text{B}} = 50\text{ mA}$	0.6		1.3 2.6	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 0.1\text{ mA}$ $V_{\text{CE}} = 10\text{ V}$ $I_{\text{C}} = 1\text{ mA}$ $V_{\text{CE}} = 10\text{ V}$ $I_{\text{C}} = 10\text{ mA}$ $V_{\text{CE}} = 10\text{ V}$ $I_{\text{C}} = 150\text{ mA}$ $V_{\text{CE}} = 10\text{ V}$ $I_{\text{C}} = 500\text{ mA}$ $V_{\text{CE}} = 10\text{ V}$ $I_{\text{C}} = 10\text{ mA}$ $V_{\text{CE}} = 10\text{ V}$ $T_{\text{amb}} = -55\text{ °C}$	75 100 100 100 50 50	-	450 300	
h_{fe}	Small signal current gain	$V_{\text{CE}} = 20\text{ V}$ $I_{\text{C}} = 20\text{ mA}$ $f = 100\text{ MHz}$ $V_{\text{CE}} = 10\text{ V}$ $I_{\text{C}} = 1\text{ mA}$ $f = 1\text{ kHz}$	2 100	-		
C_{obo}	Output capacitance ($I_{\text{E}} = 0$)	$V_{\text{CB}} = 10\text{ V}$ $100\text{ kHz} \leq f \leq 1\text{ MHz}$		-	8	pF

a. For PNP type, voltage and current values are negative.

Table 4. JANS electrical characteristics (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{ibo}	Output capacitance ($I_E = 0$)	$V_{EB} = 2\text{ V}$ $100\text{ kHz} \leq f \leq 1\text{ MHz}$		-	30	pF
t_{on}	Turn-on time	$V_{CC} = 30\text{ V}$ $I_C = 150\text{ mA}$ $I_{B1} = 15\text{ mA}$		-	45	ns
t_{off}	Turn-off time	$V_{CC} = 30\text{ V}$ $I_C = 150\text{ mA}$ $I_{B1} = -I_{B2} = 15\text{ mA}$		-	300	ns

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

2.2 ESCC electrical characteristics

Table 5. ESCC electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_E = 0$)	$V_{CB} = 50\text{ V}$ $V_{CB} = 50\text{ V}$ $T_{amb} = 150\text{ }^\circ\text{C}$		-	10 10	nA μA
$V_{(BR)CBO}$	Collector-base breakdown voltage ($I_E = 0$)	$I_C = 10\text{ }\mu\text{A}$	60	-		V
$V_{(BR)CEO}^{(1)}$	Collector-emitter breakdown voltage ($I_B = 0$)	$I_C = 10\text{ mA}$	60	-		V
$V_{(BR)EBO}$	Emitter-base breakdown voltage ($I_C = 0$)	$I_E = 10\text{ }\mu\text{A}$	5	-		V
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 150\text{ mA}$ $I_B = 15\text{ mA}$		-	0.4	V
$V_{BE(sat)}^{(1)}$	Base-emitter saturation voltage	$I_C = 150\text{ mA}$ $I_B = 15\text{ mA}$		0.87	1.3	V
$h_{FE}^{(1)}$	DC current gain	$I_C = 0.1\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 10\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 150\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}$ $V_{CE} = 10\text{ V}$	75 100 100 50	-	300	
h_{fe}	Small signal current gain	$V_{CE} = 20\text{ V}$ $I_C = 20\text{ mA}$ $f = 100\text{ MHz}$	2	-		
C_{obo}	Output capacitance ($I_E = 0$)	$V_{CB} = 10\text{ V}$ $100\text{ kHz} \leq f \leq 1\text{ MHz}$		-	8	pF
t_{on}	Turn-on time	$V_{CC} = 30\text{ V}$ $I_C = 150\text{ mA}$ $I_{B1} = 15\text{ mA}$		-	45	ns
t_{off}	Turn-off time	$V_{CC} = 30\text{ V}$ $I_C = 150\text{ mA}$ $I_{B1} = -I_{B2} = 15\text{ mA}$		-	300	ns

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

2.3 Electrical characteristics (curves)

Figure 2. DC current gain ($V_{CE}=1\text{ V}$)

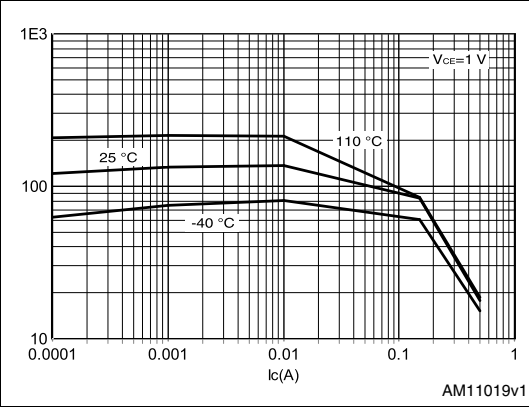


Figure 3. DC current gain ($V_{CE}=10\text{ V}$)

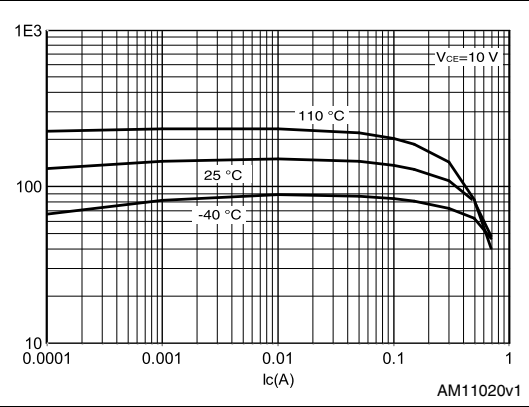


Figure 4. Collector emitter saturation voltage

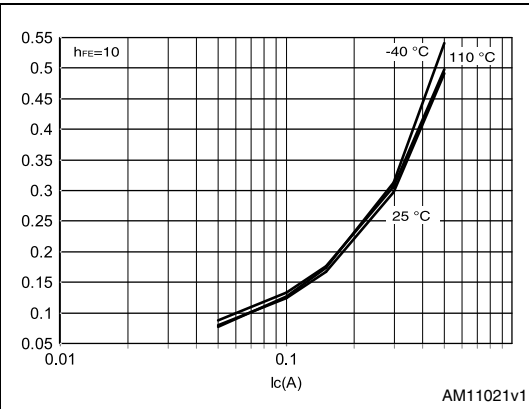
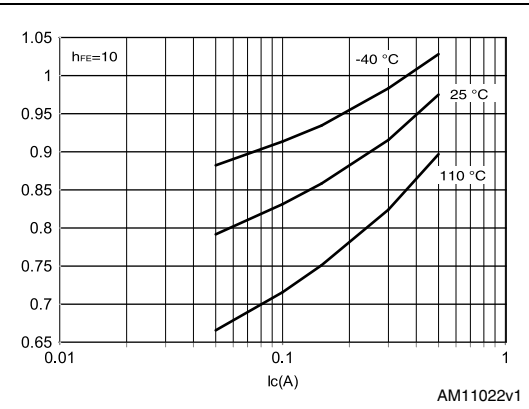


Figure 5. Base emitter saturation voltage ($h_{FE}=10$)



2.4 Test circuits

Figure 6. JANS saturated turn-on switching time test circuit

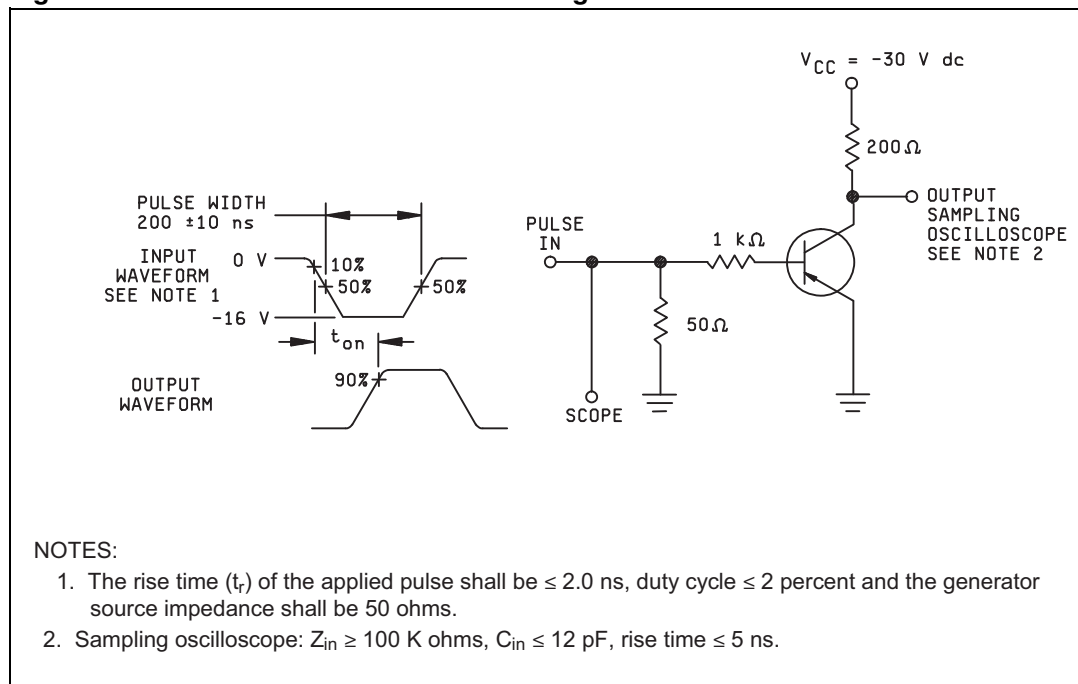


Figure 7. JANS saturated turn-off switching time test circuit

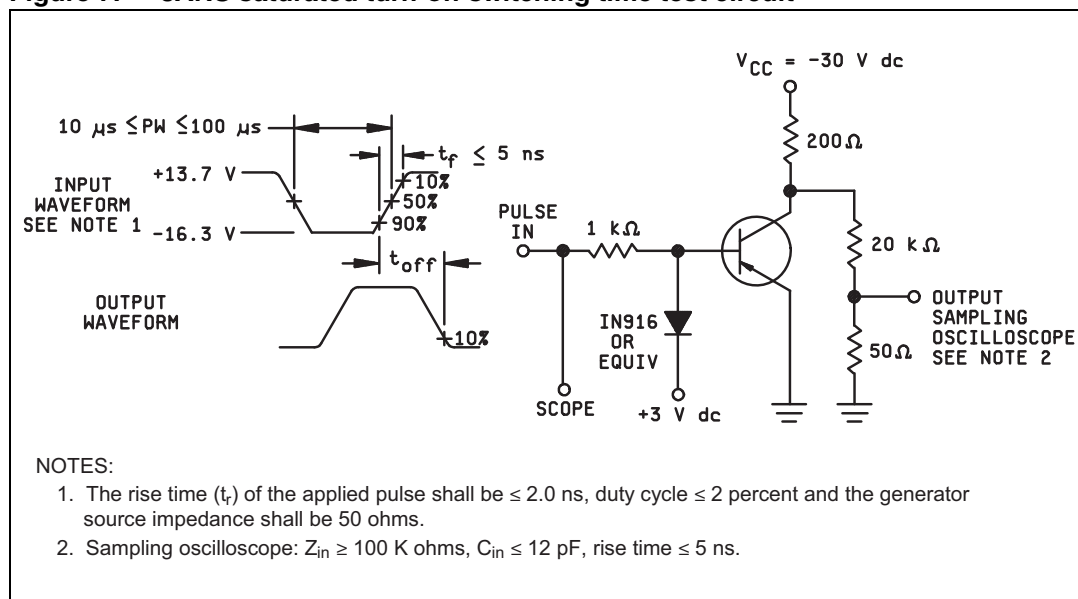
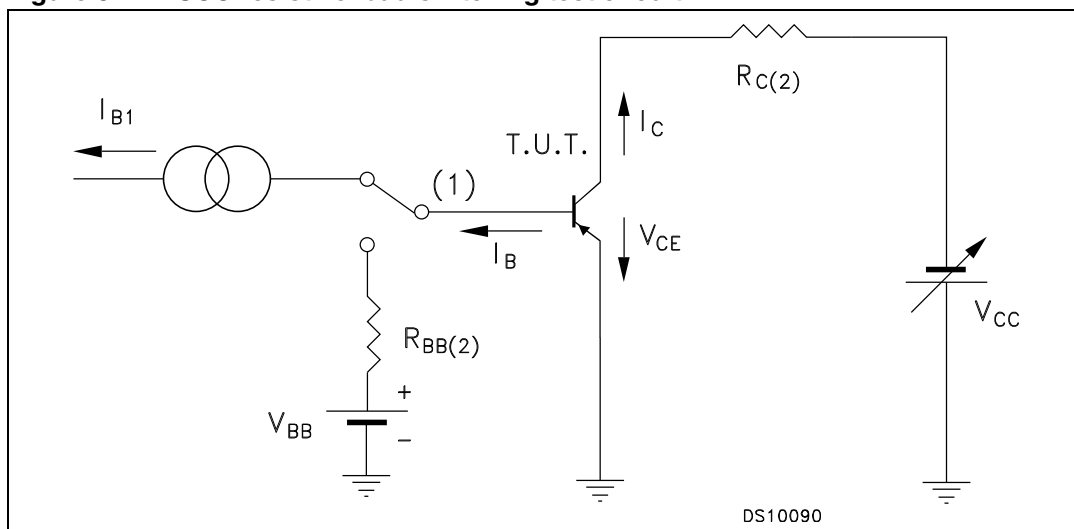


Figure 8. ESCC resistive load switching test circuit

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.

Table 6. Product mass summary

Package	Mass (g)
LCC-3UB	0.06
LCC-3	0.06
TO-18	0.40

Table 7. LCC-3UB mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	1.16		1.42
C	0.46	0.51	0.56
D	0.56	0.76	0.96
E	0.92	1.02	1.12
F	1.95	2.03	2.11
G	2.92	3.05	3.18
I	2.41	2.54	2.67
J	0.42	0.57	0.72
K	1.37	1.52	1.67
L	0.41	0.51	0.61
M	2.46	2.54	2.62
N	1.81	1.91	2.01
r		0.20	
r1		0.30	
r2		0.56	

Figure 9. LCC-3UB drawings

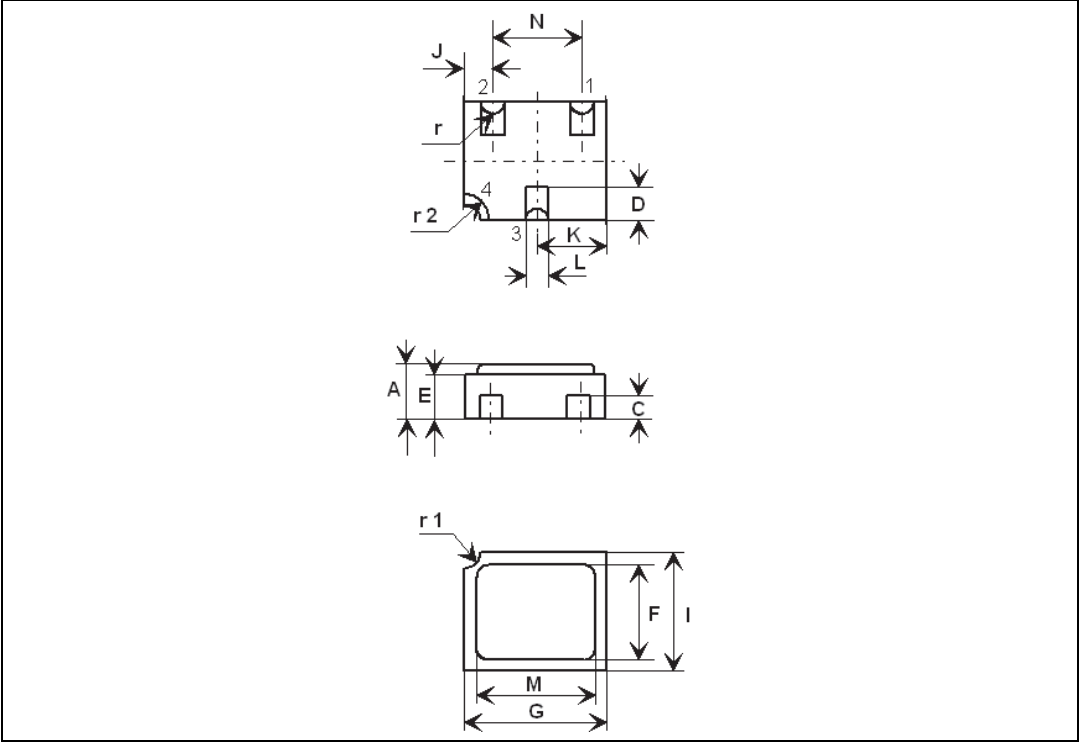


Table 8. LCC-3 mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	1.16		1.42
C	0.45	0.50	0.56
D	0.60	0.76	0.91
E	0.91	1.01	1.12
F	1.95	2.03	2.11
G	2.92	3.05	3.17
I	2.41	2.54	2.66
J	0.42	0.57	0.72
K	1.37	1.52	1.67
L	0.40	0.50	0.60
M	2.46	2.54	2.62
N	1.80	1.90	2.00
R		0.30	

Figure 10. LCC-3 drawings

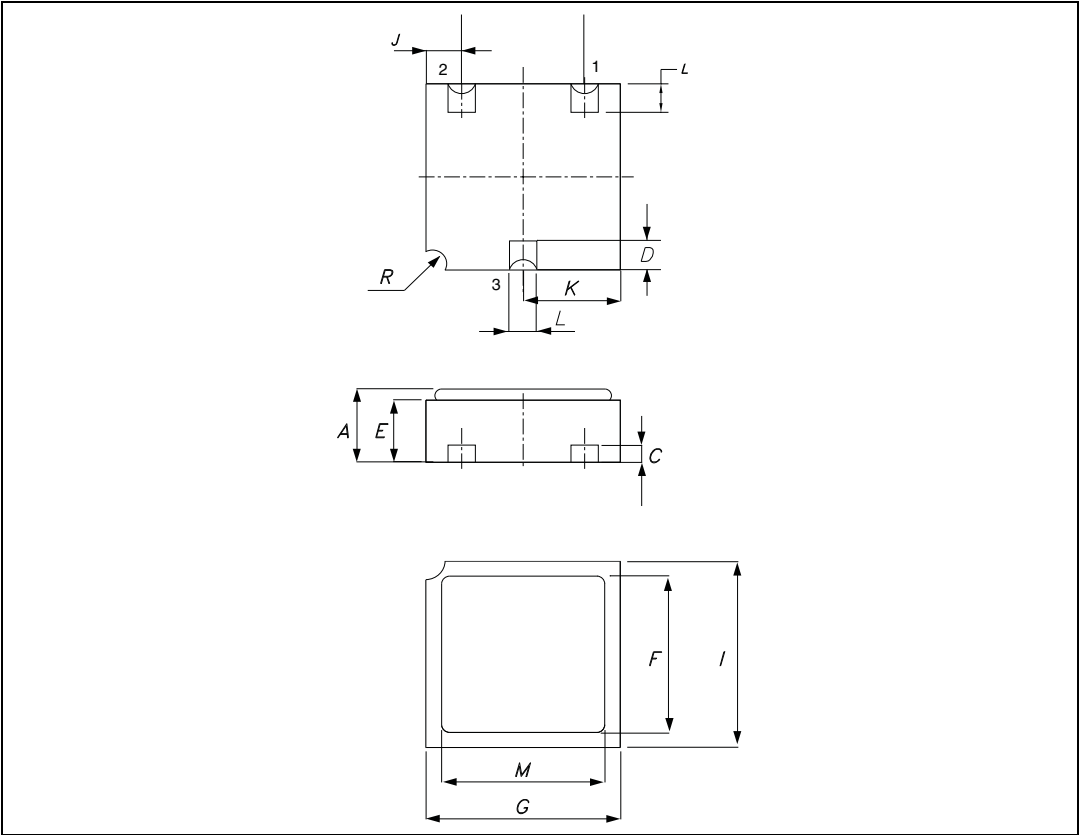
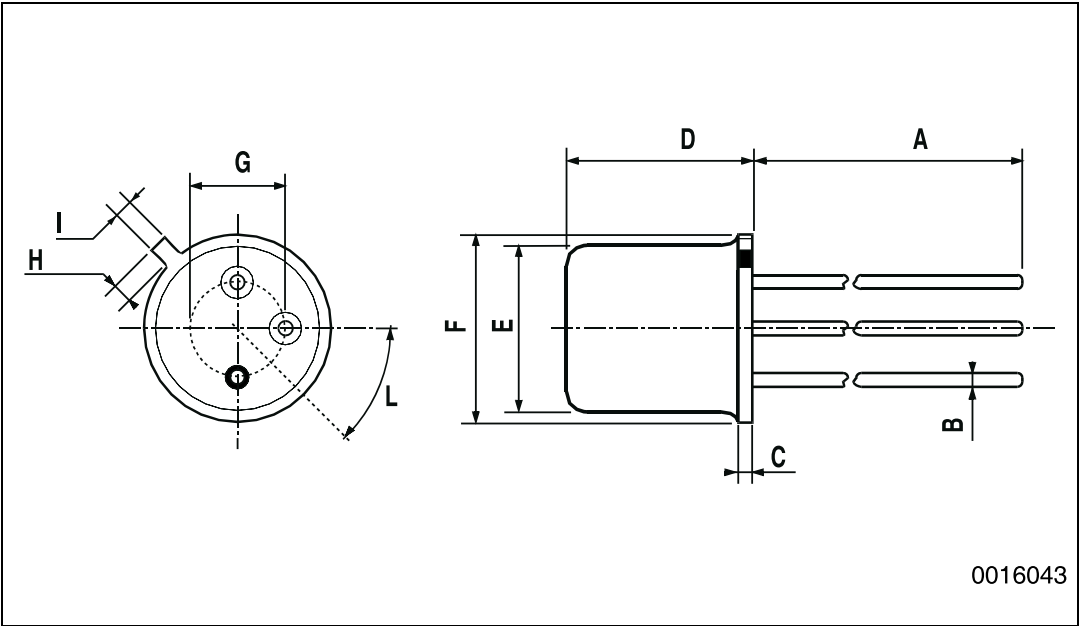


Table 9. TO-18 mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A		12.7	
B			0.49
D			5.3
E			4.9
F			5.8
G	2.54		
H			1.2
I			1.16
L	45°		

Figure 11. TO-18 drawings



4 Order codes

Table 10. Order codes

Part number	Agency specification	EPPL	Quality level	Radiation level	Package	Lead Finish	Marking ⁽¹⁾	Packing
J2N2907AUB1	-	-	Engineering model JANS	-	LCC-3UB	Gold	J2N2907A	Waffle pack
2N2907AUB1		-	Engineering model ESCC		LCC-3UB	Gold	U03	Waffle pack
SOC2907A		-	Engineering model ESCC		LCC-3	Gold	P03	Waffle pack
JANS2N2907AUBG	MIL-PRF-19500/291	-	JANS flight		LCC-3UB	Gold	JS2907	Waffle pack
JANS2N2907AUBT	MIL-PRF-19500/291	-			LCC-3UB	Solder Dip	JS2907	Waffle pack
2N2907AUB06	5202/001/06	Yes	ESCC flight		LCC-3UB	Gold	520200106	Waffle pack
2N2907AUB07	5202/001/07	Yes			LCC-3UB	Solder Dip	520200107	Waffle pack
SOC2907AHRB	5202/001/04 or 05 ⁽²⁾	Yes			LCC-3	Gold or Solder Dip ⁽²⁾	520200104 or 05 ⁽²⁾	Waffle pack
2N2907AHR	5202/001/01 or 02 ⁽²⁾	-			TO-18	Gold or Solder Dip ⁽²⁾	520200101 or 02 ⁽²⁾	Strip pack

1. Specific marking only. The full marking includes in addition:

For the engineering models : ST logo, date code, country of origin (FR).

For ESCC flight parts : ST logo, date code, country of origin (FR), ESA logo, serial number of the part within the assembly lot.

For JANS flight parts : ST logo, date code, country of origin (FR), manufacturer code (CSTM), serial number of the part within the assembly lot.

2. Depending ESCC part number mentioned on the purchase order.

Contact ST sales office for information about the specific conditions for:

- Products in die form
- Other JANS quality levels
- Tape and reel packing

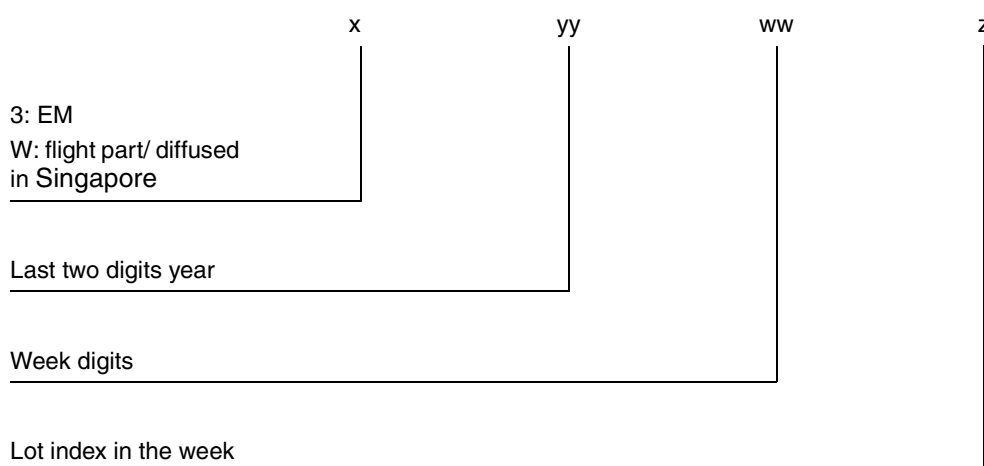
5 Shipping details

5.1 Data code

Data code is structured as described below:

- EM (ESCC and JANS) xyywwz
- ESCC Flight yywwz
- JANS Flight xyywwz

where:



5.2 Documentation

Table 11. Documentation provided for each type of product

Quality level	Radiation level	Documentation
Engineering model	-	-
JANS Flight	-	Certificate of conformance
ESCC Flight	-	Certificate of conformance

6 Revision history

Table 12. Document revision history

Date	Revision	Changes
09-Feb-2009	1	Initial release
30-Nov-2011	2	– Modified Table 1 on page 1 – Minor text changes in the document title and description on the coverpage
14-May-2012	3	New package inserted (LCC-3UB). Updated: – Table 1: Device summary, Table 2: Absolute maximum ratings and Table 3: Thermal data. – Section 2: Electrical characteristics and Section 3: Package mechanical data. Added: – Section 4: Order codes and Section 5: Shipping details.

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