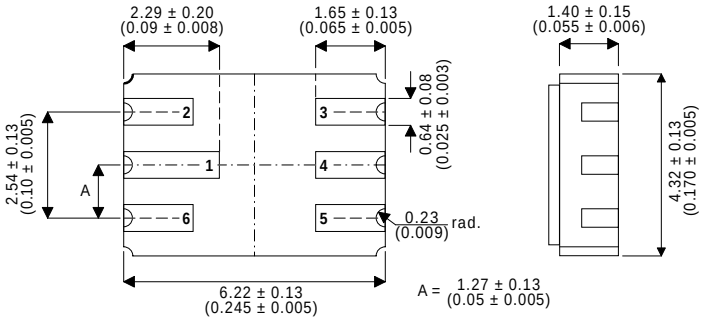
2N2920DCSM–QR–B

DUAL NPN TRANSISTORS IN A HERMETICALLY SEALED CERAMIC SURFACE MOUNT PACKAGE FOR HIGH RELIABILITY APPLICATIONS

MECHANICAL DATA
Dimensions in mm (inches)



LCC2 PACKAGE
Underside View

PAD 1 – Collector 1
PAD 2 – Base 1
PAD 3 – Base 2
PAD 4 – Collector 2
PAD 5 – Emitter 2
PAD 6 – Emitter 1

FEATURES

- **HERMETIC CERAMIC SURFACE MOUNT PACKAGE**
- **BUILT & SCREENED IN ACCORDANCE WITH CECC FULLL ASSESSMENT LEVEL AND SQUENCE B**

APPLICATIONS:

Suitable for use in general purpose differential amplifier applications.

ABSOLUTE MAXIMUM RATINGS

	(T_{amb} = 25°C unless otherwise stated)	EACH SIDE	TOTAL DEVICE
V_{CBO}	Collector – Base Voltage	60V	
V_{CEO}	Collector – Emitter Voltage [1]	60V	
V_{EBO}	Emitter – Base Voltage	5V	
I_C	Collector Current	50mA	
P_D	Total Device Dissipation	300mW	500mW
	Derate above 25°C	1.72mW / °C	2.86mW / °C
T_{STG}	Storage Temperature Range	–65 to 200°C	

NOTES
1. Base – Emitter Diode Open Circuited.

Semelab plc. Telephone +44(0)1455 556565. Fax +44(0)1455 552612.
E-mail: sales@semelab.co.uk Website: http://www.semelab.co.uk

2N2920DCSM–QR–B

ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C unless otherwise stated)

Parameter		Test Conditions [1]		Min.	Typ.	Max.	Unit
INDIVIDUAL TRANSISTOR CHARACTERISTICS							
$V_{(BR)CBO}$	Collector – Base Breakdown Voltage	I_C = –10µA	I_E = 0	60			V
$V_{(BR)CEO*}$	Collector – Emitter Breakdown Voltage	I_C = –10mA	I_B = 0	60			
$V_{(BR)EBO}$	Emitter – Base Breakdown Voltage	I_E = –10µA	I_C = 0	5			
I_{CBO}	Collector Cut-off Current	V_{CB} = –50V	I_E = 0			10	nA
			T_A = 150°C			10	µA
I_{EBO}	Emitter Cut-off Current	V_{EB} = –4V	I_C = 0			20	nA
h_{FE}	DC Current Gain	I_C = 10µA	V_{CE} = 5V	100			—
		I_C = –100µA	V_{CE} = 5V	150		450	
			T_A = –55°C	75			
		I_C = –500µA	V_{CE} = –5V	150		450	
		I_C = –1mA	V_{CE} = –5V	150		450	
		I_C = –10mA	V_{CE} = –5V *	125			
V_{BE}	Base – Emitter Voltage	I_C = –100µA	V_{CE} = –5V			–0.7	V
		I_B = –10µA	I_C = –100µA			–0.7	
		I_B = –100µA	I_C = –1mA			–0.8	
$V_{CE(sat)}$	Collector – Emitter Saturation Voltage	I_B = –10µA	I_C = –100µA			–0.2	V
		I_B = –100µA	I_C = –1mA			–0.25	
h_{ie}	Small Signal Common – Emitter Input Impedance	V_{CE} = –10V I_C = –1mA f = 1kHz		3		30	kΩ
h_{fe}	Small Signal Common – Emitter Current Gain			150		600	—
h_{re}	Small Signal Common – Emitter Reverse Voltage Gain					25 x 10^{-4}	
h_{oe}	Small Signal Common – Emitter Output Admittance			5		60	µmho
$\|h_{fe}\|$	Small Signal Common – Emitter Current Gain	V_{CE} = –5V f = 30MHz	I_C = –500µA	1			—
		V_{CE} = –5V f = 100MHz	I_C = –1mA	1		5	
C_{obo}	Common – Base Open Circuit Output Capacitance	V_{CB} = –5V f = 100kHz	I_E = 0			4	pF
C_{ibo}	Common – Base Open Circuit Input Capacitance	V_{EB} = –0.5V f = 100kHz	I_C = 0			8	

NOTES

* Pulse Test: t_p = 300µs, $\delta \leq 2\%$.

1) Terminals not under test are open circuited under all test conditions.

Semelab plc. Telephone +44(0)1455 556565. Fax +44(0)1455 552612.
E-mail: sales@semelab.co.uk Website: http://www.semelab.co.uk

ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C unless otherwise stated)

Parameter		Test Conditions	Min.	Typ.	Max.	Unit
TRANSISTOR MATCHING CHARACTERISTICS						
$\frac{h_{FE1}}{h_{FE2}}$	Static Forward Current Gain Balance Ratio	V_{CE} = –5V I_C = –100µA See Note 2.	0.9		1	—
$\lvert V_{BE1} - V_{BE2} \rvert$	Base – Emitter Voltage Differential	V_{CE} = –5V I_C = –10µA to –10mA			5	mV
		V_{CE} = –5V I_C = –100µA			3	
$\lvert \Delta(V_{BE1} - V_{BE2})\Delta T_A \rvert$	Base – Emitter Voltage Differential	V_{CE} = –5V I_C = –100µA T_{A1} = 25°C T_{A2} = –55°C			0.8	mV
		V_{CE} = –5V I_C = –100µA T_{A1} = 25°C T_{A2} = 125°C			1	

OPERATING CHARACTERISTICS (T_{amb} = 25°C unless otherwise stated)

Parameter		Test Conditions [1]	Min.	Typ.	Max.	Unit
INDIVIDUAL TRANSISTOR CHARACTERISTICS						
F	Spot Noise Figure	V_{CE} = –10V I_C = –100µA R_G = 3kΩ f = 100Hz Noise Bandwidth = 20Hz			7	dB
		V_{CE} = –10V I_C = –100µA R_G = 3kΩ f = 1kHz Noise Bandwidth = 200Hz			3	
		V_{CE} = –10V I_C = –100µA R_G = 3kΩ f = 10kHz Noise Bandwidth = 2kHz			2.5	
$\overline{F}$	Average Noise Figure	V_{CE} = –10V I_C = –100µA R_G = 3kΩ Noise Bandwidth = 15.7kHz See Note 3.			3.5	dB

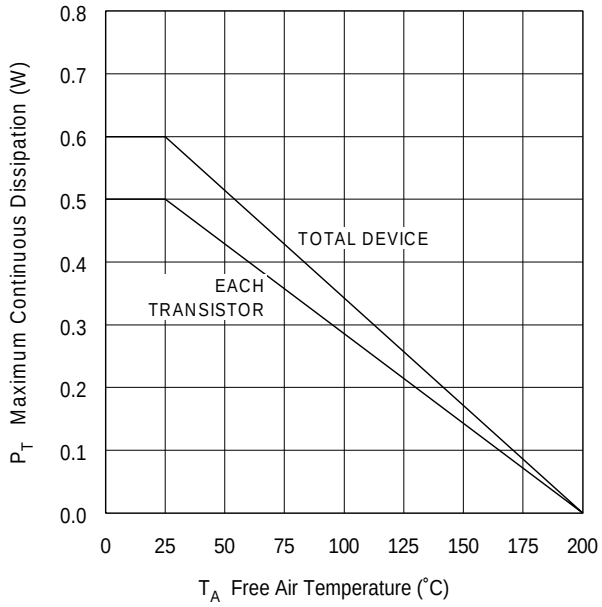
NOTES

1) Terminals not under test are open circuited under all test conditions.

2) The lower of the two readings is taken as h_{FE1}.

3) Average noise figure is measured in an amplifier with response down 3dB at 10Hz and 10 kHz and a high frequency rolloff of 6dB / octave.

THERMAL INFORMATION



SEME LAB

2N2920DCSM–QR–B

Inspection Level for CECC Fully Assessed Devices - Level F

Group A – Lot by Lot Inspection

IL = Inspection levels
AQL = Acceptable quality Level (%)

Examination or test	Levels of Quality Assessment			
	Level F			
	Observations	IL	AQL	NOTES
SUB-GROUP A1 Visual inspection		I	0.65	
SUB-GROUP A2a Non operatives		II	0.15	
SUB-GROUP A2b Electrical Measurements	Primary dc Charateristics	II il	0.65 1.0	if < 4 tests If ≥ 4 tests
SUB-GROUP A3 Electrical Measurements	Other dc Charateristics	I I	2.5 4	if < 4 tests If ≥ 4 tests
SUB-GROUP A4 Electrical Measurements	ac Characteristics	S4 S4	4 6.5	if < 4 tests If ≥ 4 tests

Group B – Lot by Lot Inspection

IL = Inspection level amb = ambient rated case = case rated
AQL in (%) c = acceptance criterion n = sample size

Examination or test	Levels of Quality Assessment		
	Level F		
	IL	AQL	NOTES
SUB-GROUP B1 Dimensions	S2	2.5	
SUB-GROUP B2c Verification of ratings	S4	4	SEE C2c
SUB-GROUP B3 Lead bending if applicable	S3	2.5	
SUB-GROUP B4 Solderability	S4	2.5	
SUB-GROUP B5 Change of temp followed by acc. Damp heat or sealing.	S4	2.5	SEE C5
SUB-GROUP B8 Electrical Endurance	S4	1.5	SEE C8
SUB-GROUP CTR	Unless otherwise stated in detail specification: attributes information for B3 B4 B5 B8		

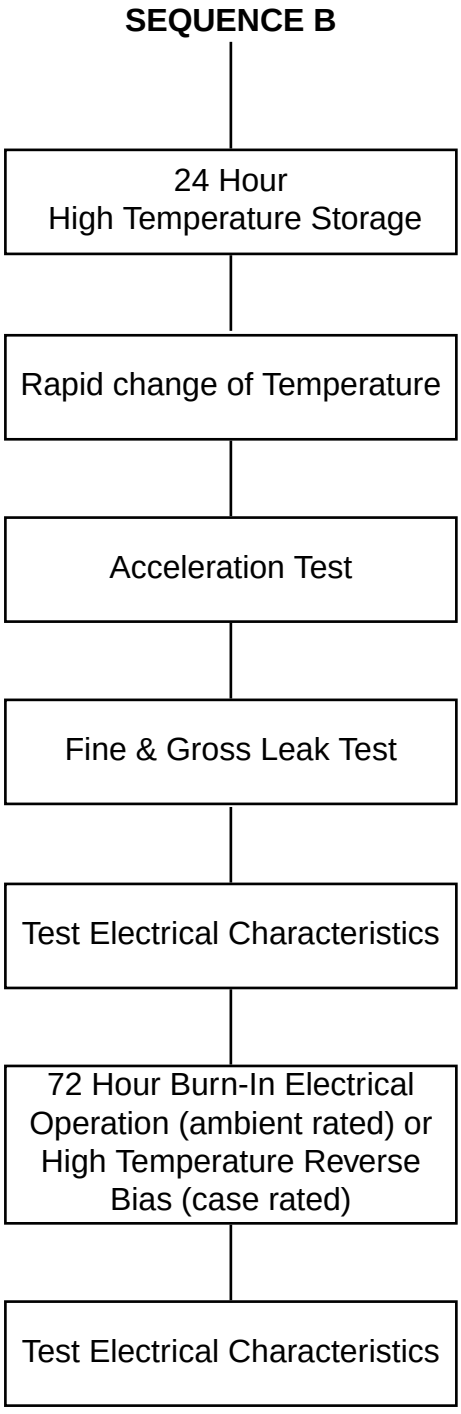
Semelab plc. Telephone +44(0)1455 556565. Fax +44(0)1455 552612.
E-mail: sales@semelab.co.uk Website: http://www.semelab.co.uk

Group C – Periodic Inspection

P = periodicity (months) na = not applied

Examination or test	Levels of Quality Assessment F (p= 3 months)	
	n/c	**NOTES**
SUB-GROUP C1 Dimensions	8/1	
SUB-GROUP C2a Electrical Measurements	13/1	
SUB-GROUP C2b Complementary Characteristics	18/1	
SUB-GROUP C2c Verification of Ratings	13/1	When not in B2c
SUB-GROUP C3 Tensile / Torque (if applicable)	8/1	
SUB-GROUP C4 Soldering Heat	18/1	
SUB-GROUP C5 Change of temp followed by acc. Damp heat or sealing.	na	see B5
SUB-GROUP C6 Shock acceleration vibration	8/1	
SUB-GROUP C7 Damp heat (if applicable)	18/1	
SUB-GROUP C8 Electrical Endurance	43/3 34/2	amb case
SUB-GROUP C9 Storage at high temp	43/3 34/2	amb case
SUB-GROUP CTR	Unless otherwise stated in detail specification: attributes information for C3, C5, C6, C9. Measurement inofrmation before and after C8	

Screening According to CECC Sequence B



Semelab plc. Telephone +44(0)1455 556565. Fax +44(0)1455 552612.
E-mail: sales@semelab.co.uk Website: http://www.semelab.co.uk