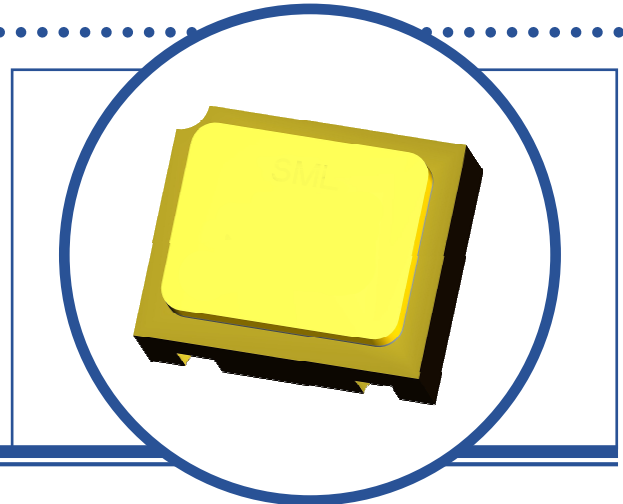


# SILICON RF SMALL SIGNAL NPN TRANSISTOR

## 2N2857C1

- High Current Gain-Bandwidth Product ( $f_T$ )
- Hermetic Ceramic Surface Mount Package
- Designed For High Gain, Low Noise Amplifier, Oscillator and Mixer Applications
- Screening Options Available



### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise stated)

$V_{CBO}$	Collector – Base Voltage		30V
$V_{CEO}$	Collector – Emitter Voltage		15V
$V_{EBO}$	Emitter – Base Voltage		3V
$I_C$	Continuous Collector Current		40mA
$P_D$	Total Power Dissipation at	$T_A = 25^\circ\text{C}$	200mW
		Derate Above $25^\circ\text{C}$	1.14mW/ $^\circ\text{C}$
$P_D$	Total Power Dissipation at	$T_C = 25^\circ\text{C}$	300mW
		Derate Above $25^\circ\text{C}$	1.72mW/ $^\circ\text{C}$
$T_J$	Junction Temperature Range		-65 to +200 $^\circ\text{C}$
$T_{stg}$	Storage Temperature Range		-65 to +200 $^\circ\text{C}$

### THERMAL PROPERTIES

Symbols	Parameters	Max.	Units
$R_{\theta JA}$	Thermal Resistance, Junction To Ambient	875	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction To Case	583.3	$^\circ\text{C/W}$

Semelab Limited reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.

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## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise stated)

Symbols	Parameters	Test Conditions	Min	Typ	Max	Units
$V_{(BR)CEO}^{(1)}$	Collector-Emitter Breakdown Voltage	$I_C = 3\text{mA}$ $I_B = 0$	15			V
$I_{CBO}$	Collector-Cut-Off Current	$V_{CB} = 15\text{V}$ $I_E = 0$			10	nA
		$T_A = 150^\circ\text{C}$			1.0	$\mu\text{A}$
		$V_{CB} = 30\text{V}$ $I_E = 0$			1.0	
$I_{CES}$	Collector-Cut-Off Current	$V_{CE} = 16\text{V}$ $I_B = 0$			100	nA
$I_{EBO}$	Emitter-Cut-Off Current	$V_{EB} = 3\text{V}$ $I_C = 0$			10	$\mu\text{A}$
$h_{FE}^{(1)}$	Forward-current transfer ratio	$I_C = 3\text{mA}$ $V_{CE} = 1.0\text{V}$	30		150	
		$T_A = -55^\circ\text{C}$	10			
$V_{CE(sat)}^{(1)}$	Collector-Emitter Saturation Voltage	$I_C = 10\text{mA}$ $I_B = 1.0\text{mA}$			0.4	V
$V_{BE(sat)}^{(1)}$	Base-Emitter Saturation Voltage	$I_C = 10\text{mA}$ $I_B = 1.0\text{mA}$			1.0	

## DYNAMIC CHARACTERISTICS

$ h_{fe} $	Small signal forward-current transfer ratio	$I_C = 5\text{mA}$ $V_{CE} = 6\text{V}$ $f = 100\text{MHz}$	10		21	
$h_{fe}$	Small Signal Current Gain	$I_C = 2\text{mA}$ $V_{CE} = 6\text{V}$ $f = 1.0\text{KHz}$	50		220	
$C_{cb}$	Collector – Base Feedback Capacitance	$V_{CB} = 10\text{V}$ $I_E = 0$ $f = 1.0\text{MHz}$			1.0	pF
$r_b' C_C^{(2)}$	Collector Base Time Constant	$I_E = 2\text{mA}$ $V_{CB} = 6\text{V}$ $f = 31.9\text{MHz}$	4		15	ps
$G_{pe}^{(2)}$	Small Signal Power Gain	$V_{CE} = 6\text{V}$ $I_C = 1.5\text{mA}$ $f = 450\text{MHz}$	12.5			dB
NF <sup>(2)</sup>	Noise Figure	$V_{CE} = 6\text{V}$ $I_C = 1.5\text{mA}$ $f = 450\text{MHz}$ $R_G = 50\Omega$			4.5	

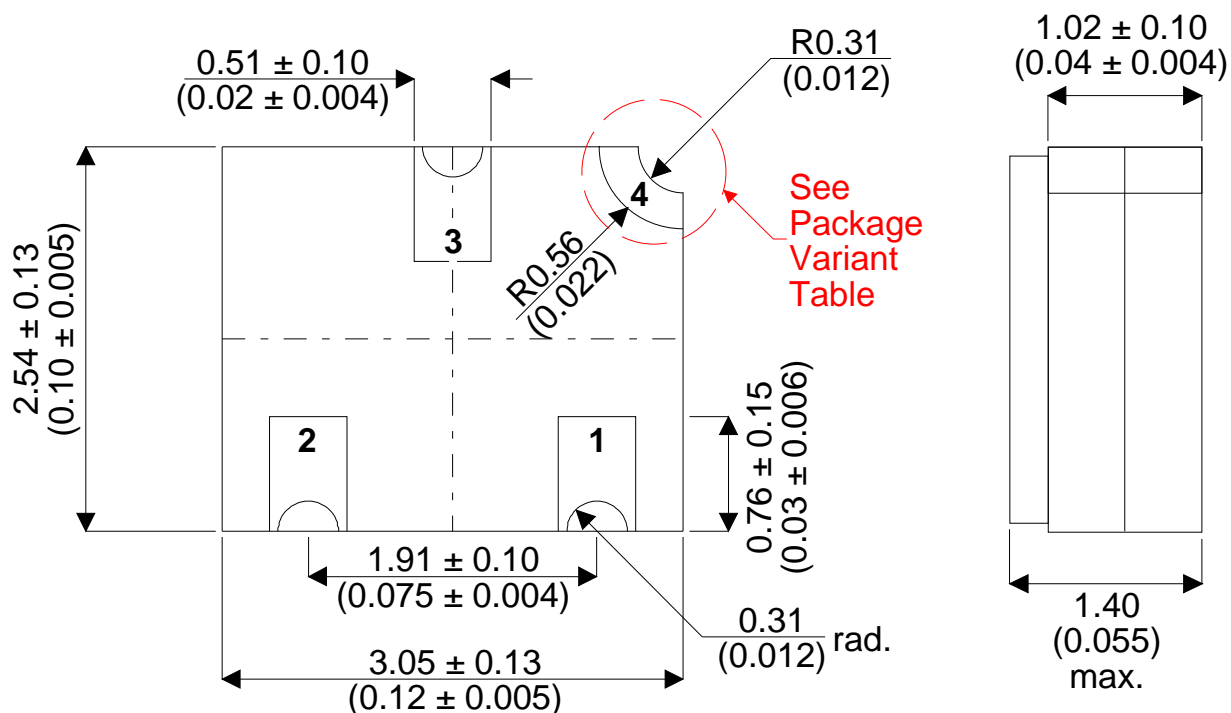
### Notes

- (1) Pulse Width  $\leq 300\mu\text{s}$ ,  $\delta \leq 2\%$   
(2) By design only, not a production test.

# SILICON RF SMALL SIGNAL NPN TRANSISTOR 2N2857C1

## MECHANICAL DATA

Dimensions in mm (inches)



**C1**  
**Underside View**

## PACKAGE VARIANT TABLE

Variant	Pad 1	Pad 2	Pad 3	Pad 4
C1A	Base	Emitter	Collector	No Pad (3-Pins Only)
C1B	Base	Emitter	Collector	Lid Contact *

\* The additional contact provides a connection to the lid in the application. Connecting the metal lid to a known electrical potential stops deep dielectric discharge in space applications; see the Space Weather link [www.semelab.co.uk/mil/lcc1\\_4](http://www.semelab.co.uk/mil/lcc1_4) on the Semelab web site. Package variant to be specified at order.

# SILICON RF SMALL SIGNAL NPN TRANSISTOR 2N2857C1

## SCREENING OPTIONS

Space Level (JQRS/ESA) and High Reliability options are available in accordance with the [High Reliability and Screening Options Handbook](#) available for download from the from the TT electronics Semelab web site.

ESA Quality Level Products are based on the testing procedures specified in the generic ESCC 5000 and in the corresponding part detail specifications.

Semelabs QR216 and QR217 processing specifications (JQRS), in conjunction with the companies ISO 9001:2000 approval present a viable alternative to the American MIL-PRF-19500 space level processing.

QR217 (Space Level Quality Conformance) is based on the quality conformance inspection requirements of MIL-PRF-19500 groups A (table V), B (table VIa), C (table VII) and also ESA / ESCC 5000 (chart F4) lot validation tests.

QR216 (Space Level Screening) is based on the screening requirements of MIL-PRF-19500 (table IV) and also ESA / ESCC 5000 (chart F3).

JQRS parts are processed to the device data sheet and screened to QR216 with conformance testing to Q217 groups A and B in accordance with MIL-STD-750 methods and procedures.

Additional conformance options are available, for example Pre-Cap Visual Inspection, Buy-Off Visit or Data Packs. These are chargeable and must be specified at the order stage (See Ordering Information). Minimum order quantities may apply.

Alternative or additional customer specific conformance or screening requirements would be considered. Contact Semelab sales with enquiries.

## MARKING DETAILS

Parts are typically marked with specification number, serial number (or week of seal) as shown in the example below.

Customer specific marking requirements can be arranged at time of order but is approximately limited to two lines of 7 Characters. This is to ensure text remains readable..

Example Marking:



## ORDERING INFORMATION

Part number is built from part and screening level. The part number can be extended to include the additional options as shown below.

Type – See Main Part Number

Package Variant – See Mechanical Data

Screening Level – See Screening Options (ESA / JQRS)

Additional Options:

Customer Pre-Cap Visual Inspection	.CVP
Customer Buy-Off visit	.CVB
Data Pack	.DA
Solderability Samples	.SS
Scanning Electron Microscopy	.SEM
Radiography (X-ray)	.XRAY
Total Dose Radiation Test	.RAD
MIL-PRF-19500 (QR217)	
Group B charge	.GRPB
Group B destructive mechanical samples	.GBDM (12 pieces)
Group C charge	.GRPC
Group C destructive electrical samples	.GCDE (12 pieces)
Group C destructive mechanical samples	.GCDM (6 pieces)
ESA/ESCC	
Lot Validation Testing (subgroup 1) charge	.LVT1
LVT1 destructive samples (environmental)	.L1DE (15 pieces)
LVT1 destructive samples (mechanical)	.L1DM (15 pieces)
Lot Validation Testing (subgroup 2) charge	.LVT2
LVT2 endurance samples (electrical)	.L2D (15 pieces)
Lot Validation Testing (subgroup 3) charge	.LVT3
LVT3 destructive samples (mechanical)	.L3D (5 pieces)

Additional Option Notes:

- 1) All 'Additional Options' are chargeable and must be specified at order stage.
- 2) When Group B,C or LVT is required, additional electrical and mechanical destructive samples must be ordered
- 3) All destructive samples are marked the same as other production parts unless otherwise requested.

Example ordering information:

The following example is for the variant B package with, JQRS screening, additional Group C conformance testing and a Data pack.

Part Numbers:

- 2N2857C1B-JQRS (Include quantity for flight parts)
- 2N2857C1B-JQRS.GRPC (chargeable conformance option)
- 2N2857C1B-JQRS.GCDE (charge for destructive parts)
- 2N2857C1B-JQRS.GCDM (charge for destructive parts)
- 2N2857C1B-JQRS.DA (charge for Data pack)

Customers with any specific requirements (e.g. marking, package or screening) may be supplied with a similar alternative part number (there is maximum 20 character limit to part numbers). Requirements for deep dielectric discharge variant (C1B) must be specified at time of order. Contact Semelab sales with all enquiries