

The SP8713 is a switchable divide by 64/65/72 programmable divider which is guaranteed to operate up to 1100MHz. It will operate from a supply of 2.7V to 5.25V and requires typically 4.1mA (including the output current). It also features a power down facility for battery economy.

The RF inputs are internally biased and should be capacitively coupled to the signal source. The output is designed to interface with CMOS synthesisers, such as the NJ88C50.

FEATURES

- Operation to 1100MHz
- Very Low Power
- Single Supply Operation 2.7V to 5.25V
- Power Down Facility for Battery Economy
- Latched Modulus Control Inputs
- Push Pull Output Drive
- ESD Protection on All Pins†

APPLICATIONS

- Cellular Telephones
- Cordless Telephones
- Mobile Radio

† ESD precautions must be observed

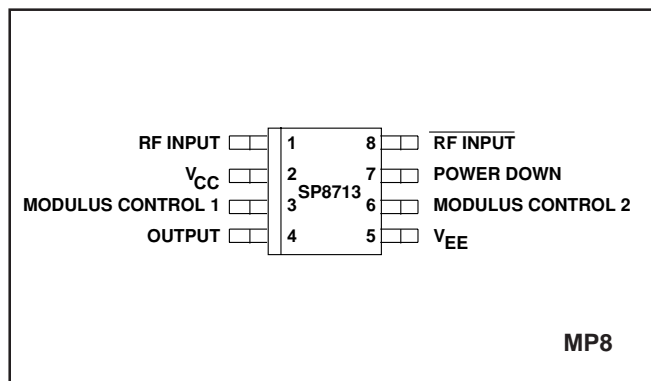


Fig. 1 Pin connections - top view

ORDERING INFORMATION

SP8713 IG MPAS Industrial Temperature Range
Miniature Plastic DIL Package

SP8713 IG MPAC As above supplied on Tape and Reel

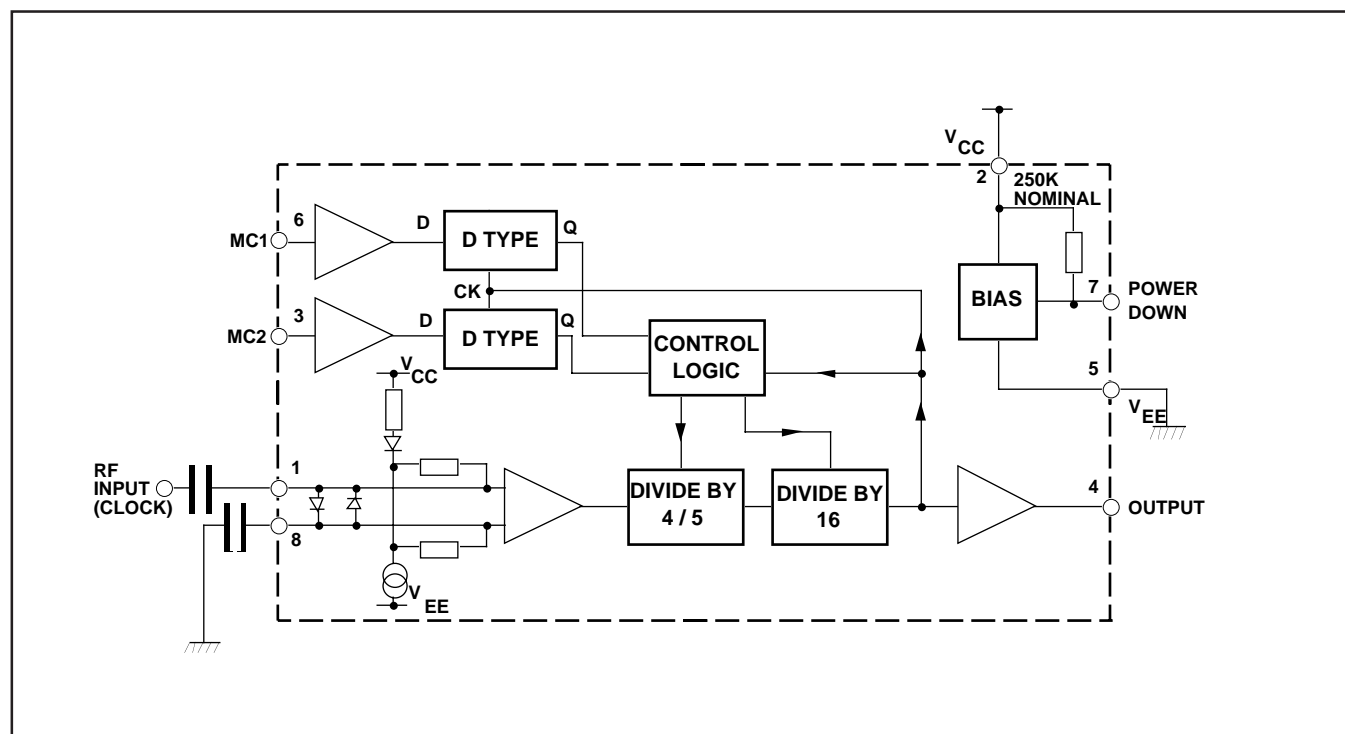


Fig. 2 Block diagram

ABSOLUTE MAXIMUM RATINGS

| | | |
|--------------------------------|----------|------------------------|
| Supply voltage ($V_{EE}=0V$) | (note 1) | -0.5V to 7V |
| Control and RF inputs, | | |
| RF output ($V_{EE}=0V$) | (note 1) | -0.5V to $V_{CC}+0.5V$ |
| RF input current | (note 1) | 10mA |
| Operating temperature | | -40°C to +85°C |
| Storage temperature range | | -55°C to +150°C |
| Maximum junction temperature | | +150°C |

NOTE 1. Duration <2 minutes.

ELECTRICAL CHARACTERISTICS**Guaranteed over the following conditions (unless otherwise stated):** $V_{CC}=+2.7V$ to $+5.25V$ (with respect to V_{EE}), Output load (pin 4) = 10pF, T_{amb} = -40°C to +85°C (note 2)

| Characteristic | | Value | | | Units | Conditions |
|------------------------------------|---------------|--------------|------|--------------|---------|--|
| | | Min. | Typ. | Max. | | |
| Supply current | (note 3) | | 4.1 | 4.7 | mA | Power down input low |
| Supply current | (note 3) | | 8 | 50 | μA | Power down input high |
| Power down high | | $V_{CC}-0.5$ | | V_{CC} | V | |
| Power down low | | 0 | | $V_{CC}-2.0$ | V | |
| Modulus control 1 high | (note 4) | $0.6V_{CC}$ | | V_{CC} | V | Divide by 64 or 72 |
| Modulus control 1 low | (note 4) | 0 | | $0.4V_{CC}$ | V | Divide by 65 or 72 |
| Modulus control 2 high | (note 4) | $0.6V_{CC}$ | | V_{CC} | V | Divide by 72 |
| Modulus control 2 select low | (note 4) | 0 | | $0.4V_{CC}$ | V | Divide by 64 or 65 |
| Max. sinewave input frequency | | 1100 | | | MHz | See Figure 5 |
| Min. sinewave input frequency | | | | 200 | MHz | See Figure 5 |
| Min. RF input voltage | | | | 50 | mV RMS | RF input 200MHz to 1100MHz. See Figure 5 |
| Max. RF input voltage | | 200 | | | mV RMS | RF input 200MHz to 1100MHz. See Figure 5 |
| Output level (pin 4) | | 500 | 600 | | mV p-p | |
| Modulus set-up time, t_s | (notes 5,6,8) | 20 | | | ns | RF input = 1GHz |
| Modulus hold time, t_h | (notes 6,8) | | | 1 | ns | RF input = 1GHz |
| Power down time, t_{pd} | (notes 7,8) | | | 10 | μs | See Figure 9 |
| Power down recovery time, t_{pu} | (notes 7,8) | | | 6 | μs | See Figure 9 |

NOTES

2. All electrical testing is performed at +85°C.

3. Typical values are measured at +25°C and $V_{CC} = +5V$.

4. Modulus Control and Ratio Select are high impedance inputs which can be driven directly by standard CMOS outputs.

5. Modulus control is latched at the end of the previous cycle.

6. See Figure 4.

7. See Figure 8.

8. These parameters are not tested but are guaranteed by design.

OPERATING NOTES

The RF inputs are biased internally and are normally coupled to the signal source with suitable capacitors.

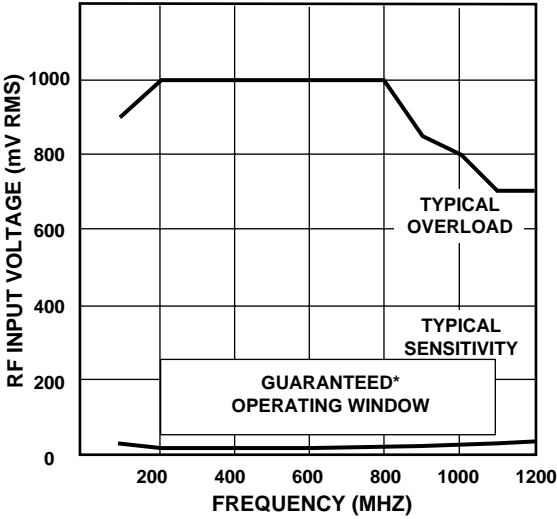
The output stage has a novel design and is intended to drive a CMOS synthesiser input. External pull-down resistors or circuits are not required. The SP8713 is not suitable for driving TTL or similar devices.

The device will operate down to DC frequencies for non-sinusoidal signals provided that the input slew rate is better than 100V/ μ s.

POWER DOWN (pin 7) is connected internally to a pull-up resistor. If the battery economy facility is not used, pin 7 should be connected to V_{EE} .

| Modulus Control 1 (Pin 3) | Modulus Control 2 (Pin 6) | Division Ratio |
|---------------------------|---------------------------|----------------|
| L | L | 65 |
| H | L | 64 |
| H | H | 72 |
| L | H | 72 |

Table 1 Truth table



* Tested as specified in table of Electrical Characteristics

Fig. 3 Typical input characteristics

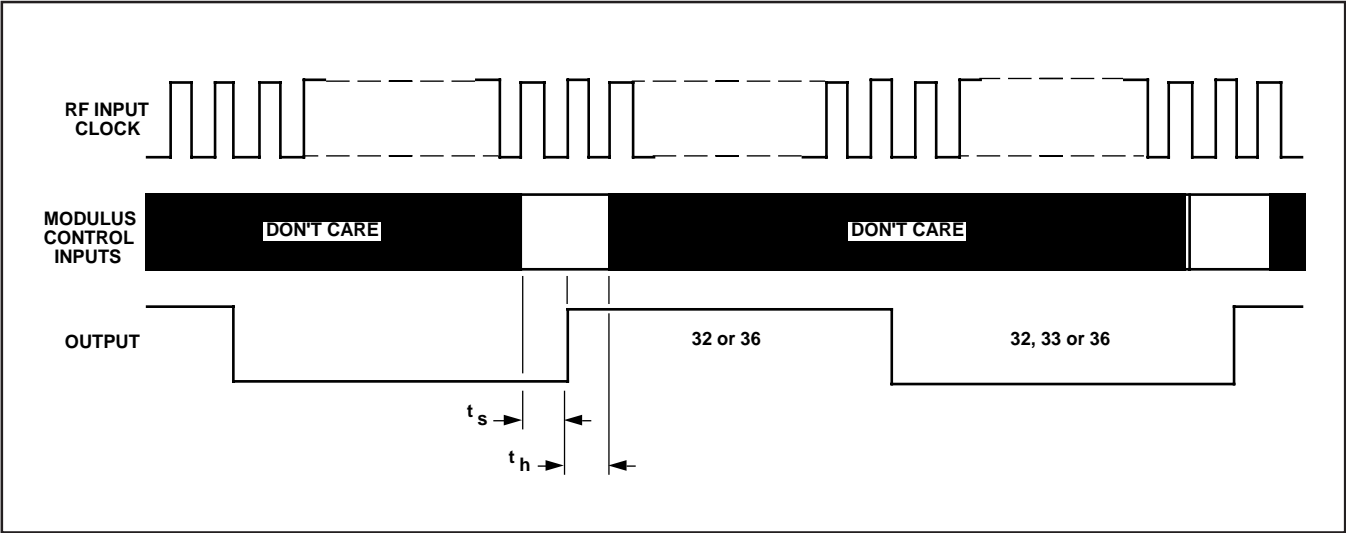


Fig. 4 Modulus control timing diagram

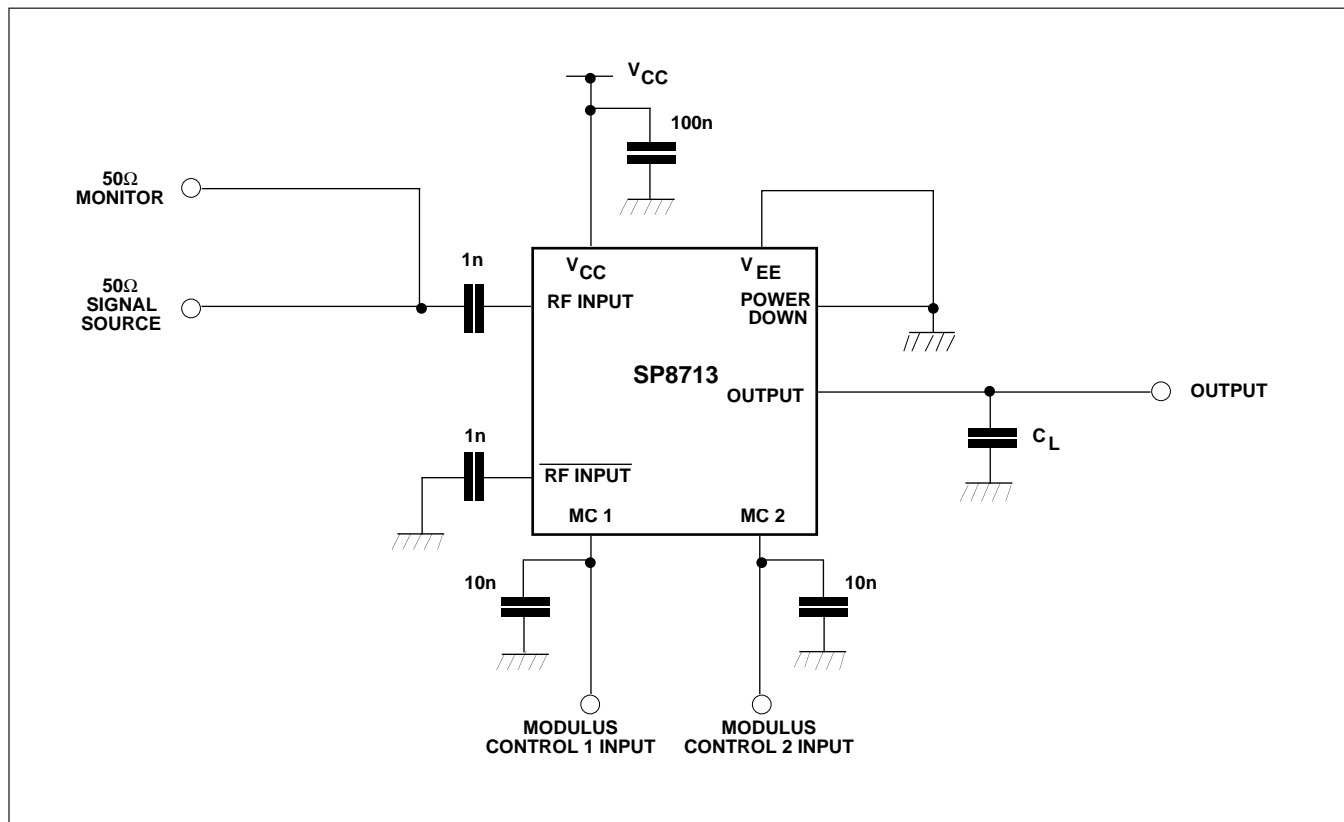


Fig. 5 Toggle frequency test circuit

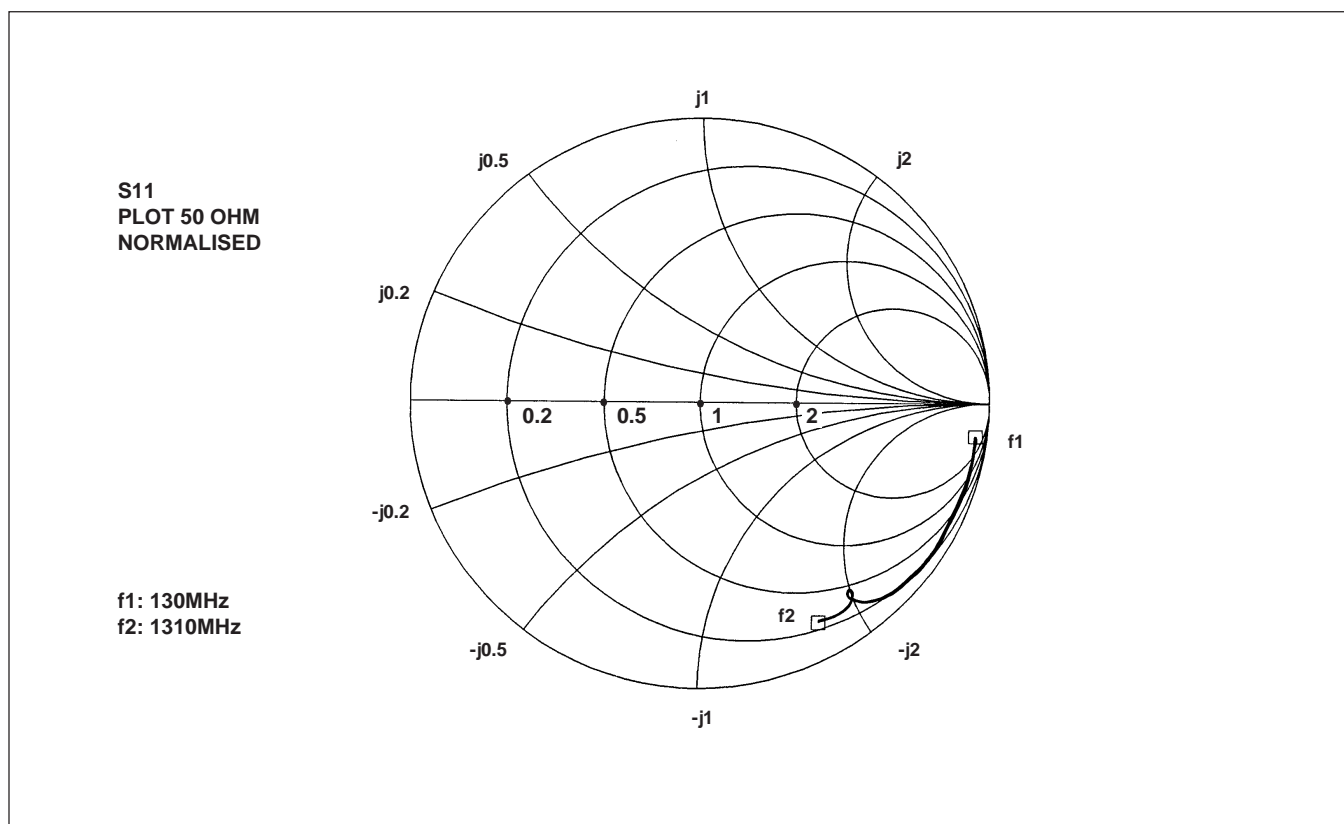


Fig. 6 Typical S11 parameter for pin 1. $V_{CC} = +5.0V$

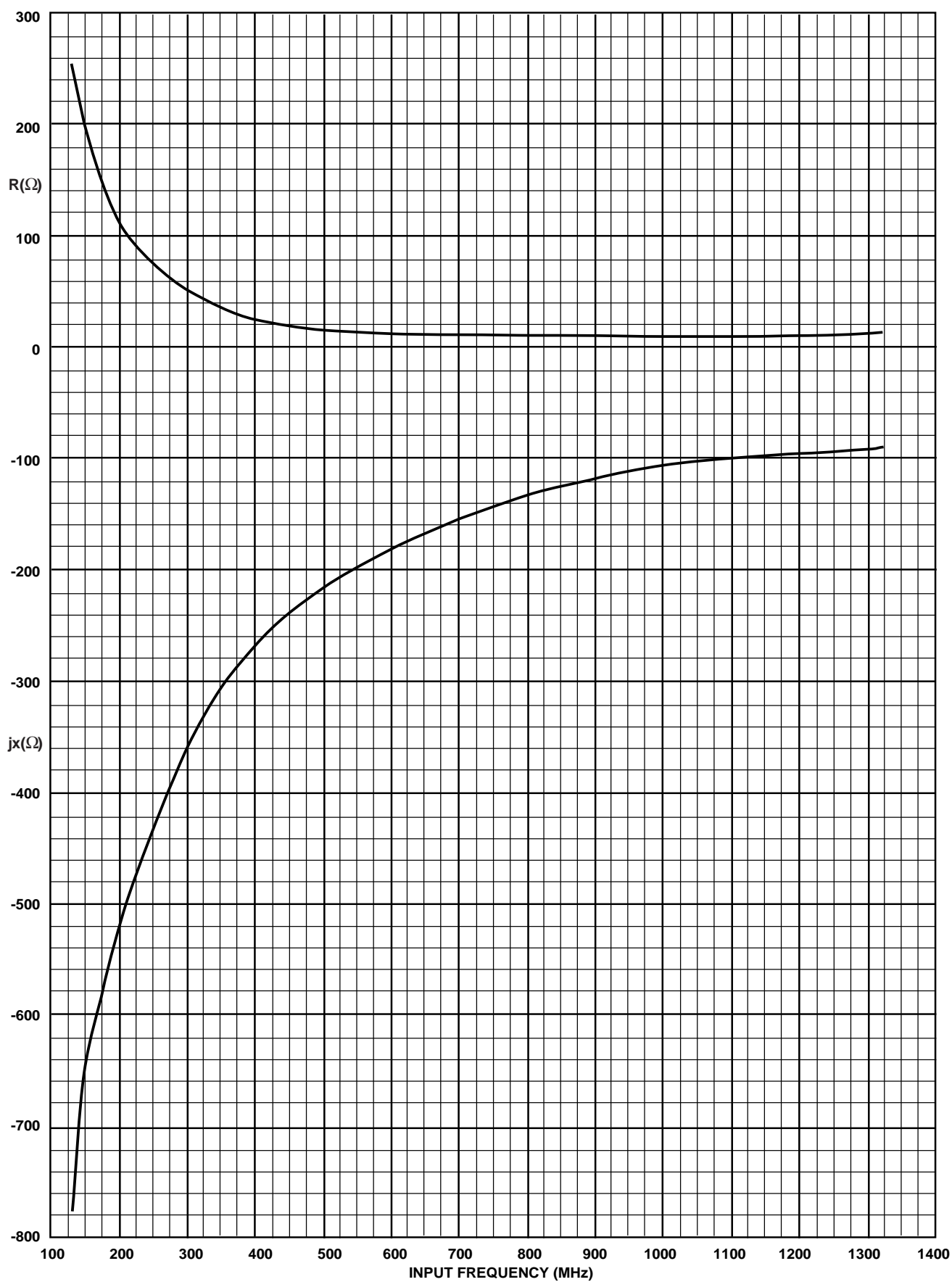


Fig. 7 Typical input impedance v. frequency

| FREQ-MHZ | R (Ω) | jx (Ω) |
|----------|----------------|-----------------|
| 130.000 | 255.068 | -733.538 |
| 153.600 | 153.362 | -688.623 |
| 177.200 | 153.330 | -583.339 |
| 200.800 | 115.187 | -545.839 |
| 224.400 | 88.649 | -482.377 |
| 248.000 | 80.815 | -441.798 |
| 271.600 | 71.050 | -411.502 |
| 295.200 | 56.207 | -369.645 |
| 318.800 | 39.526 | -346.620 |
| 342.400 | 41.338 | -323.129 |
| 366.000 | 38.779 | -304.804 |
| 389.600 | 39.210 | -280.556 |
| 413.200 | 23.809 | -269.674 |
| 436.800 | 21.221 | -255.279 |
| 460.400 | 27.545 | -245.161 |
| 484.000 | 23.333 | -234.680 |
| 507.600 | 22.227 | -224.572 |
| 531.200 | 19.931 | -211.375 |
| 554.800 | 17.767 | -203.241 |
| 578.400 | 17.636 | -194.613 |
| 602.000 | 14.607 | -186.545 |
| 625.600 | 12.479 | -182.049 |
| 649.200 | 13.075 | -174.839 |
| 672.800 | 12.891 | -168.320 |
| 696.400 | 12.583 | -160.468 |
| 720.000 | 11.250 | -156.267 |
| 743.600 | 10.213 | -149.642 |
| 767.200 | 10.187 | -145.328 |
| 790.800 | 11.269 | -143.144 |
| 814.400 | 11.081 | -137.557 |
| 838.000 | 10.509 | -132.750 |
| 861.600 | 10.063 | -129.254 |
| 885.200 | 10.172 | -124.495 |
| 908.800 | 10.745 | -120.568 |
| 932.400 | 10.841 | -118.100 |
| 956.000 | 10.884 | -113.395 |
| 979.600 | 12.260 | -109.552 |
| 1003.20 | 12.984 | -105.975 |
| 1026.80 | 14.508 | -103.110 |
| 1050.40 | 16.625 | -99.886 |
| 1074.00 | 19.260 | -98.149 |
| 1097.60 | 22.799 | -98.605 |
| 1121.20 | 23.285 | -99.907 |
| 1144.80 | 21.149 | -100.925 |
| 1168.40 | 18.956 | -99.639 |
| 1192.00 | 16.434 | -98.425 |
| 1215.60 | 14.377 | -95.033 |
| 1239.20 | 13.743 | -92.553 |
| 1262.80 | 12.711 | -89.249 |
| 1286.40 | 12.776 | -86.081 |
| 1310.00 | 12.598 | -82.581 |

Table.2 Coefficients for Fig.7

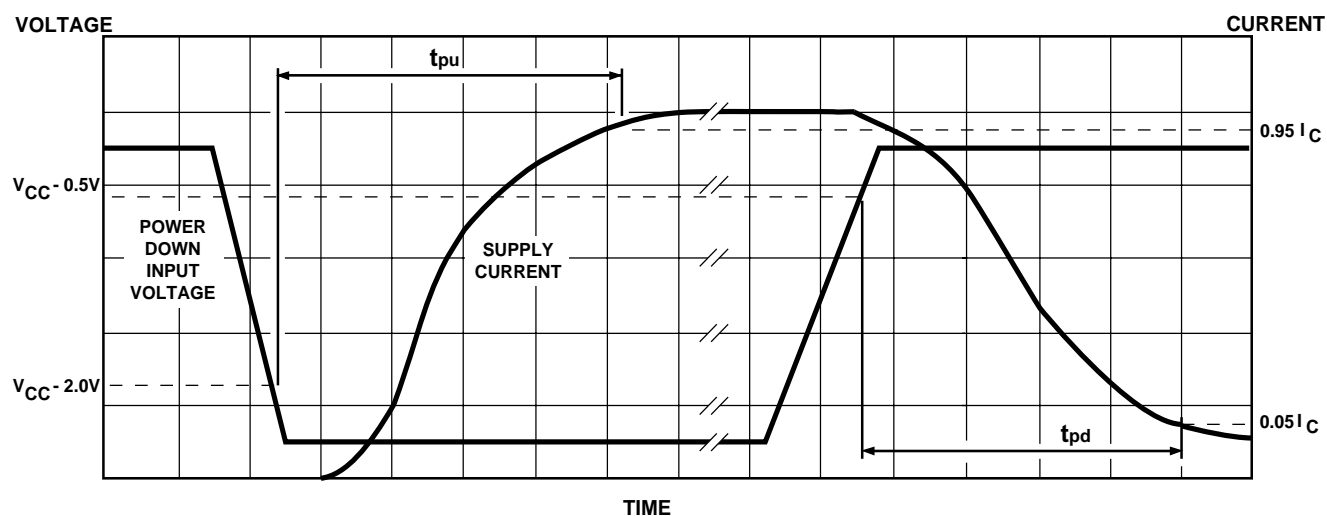


Fig. 8 Power up and power down

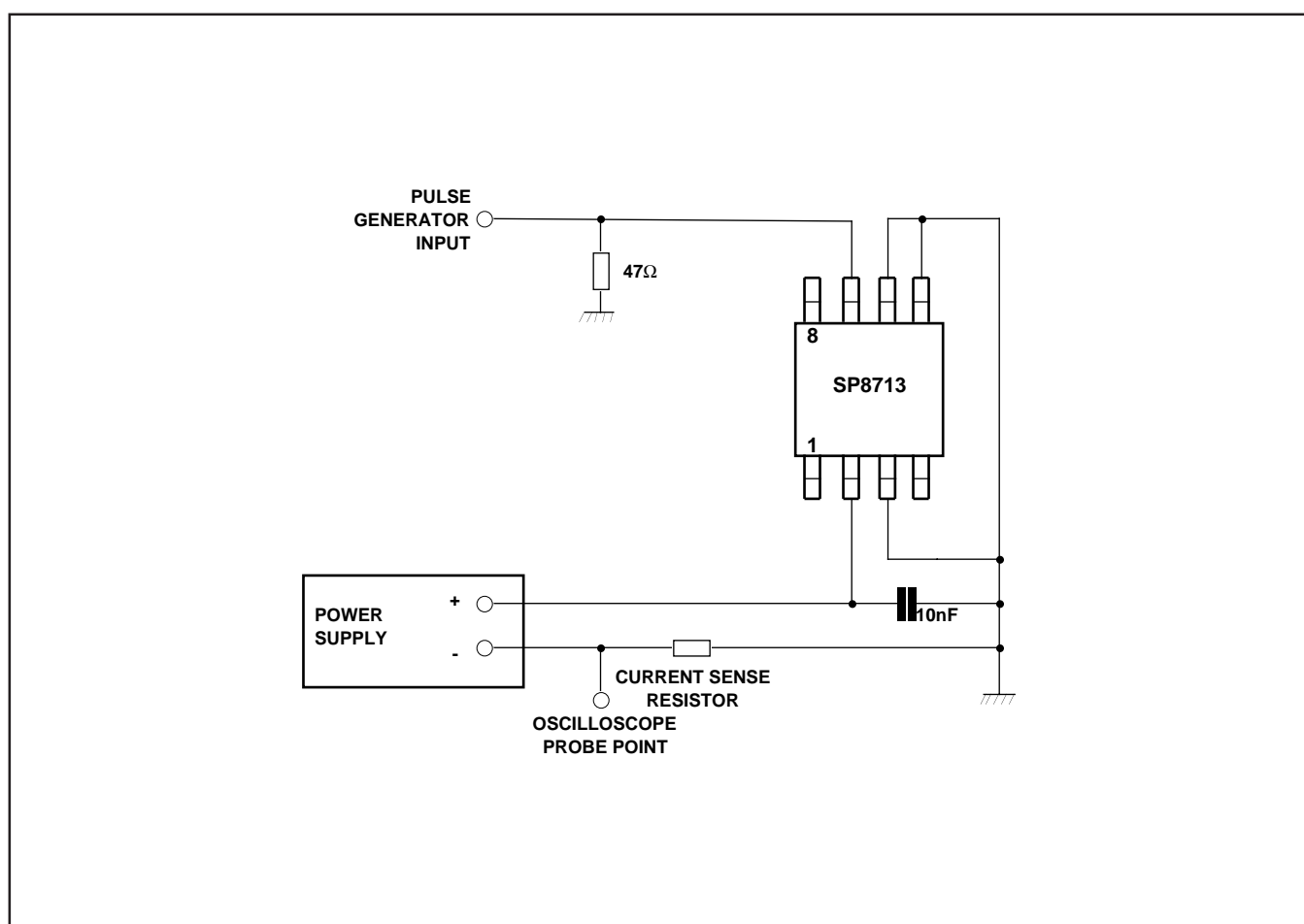
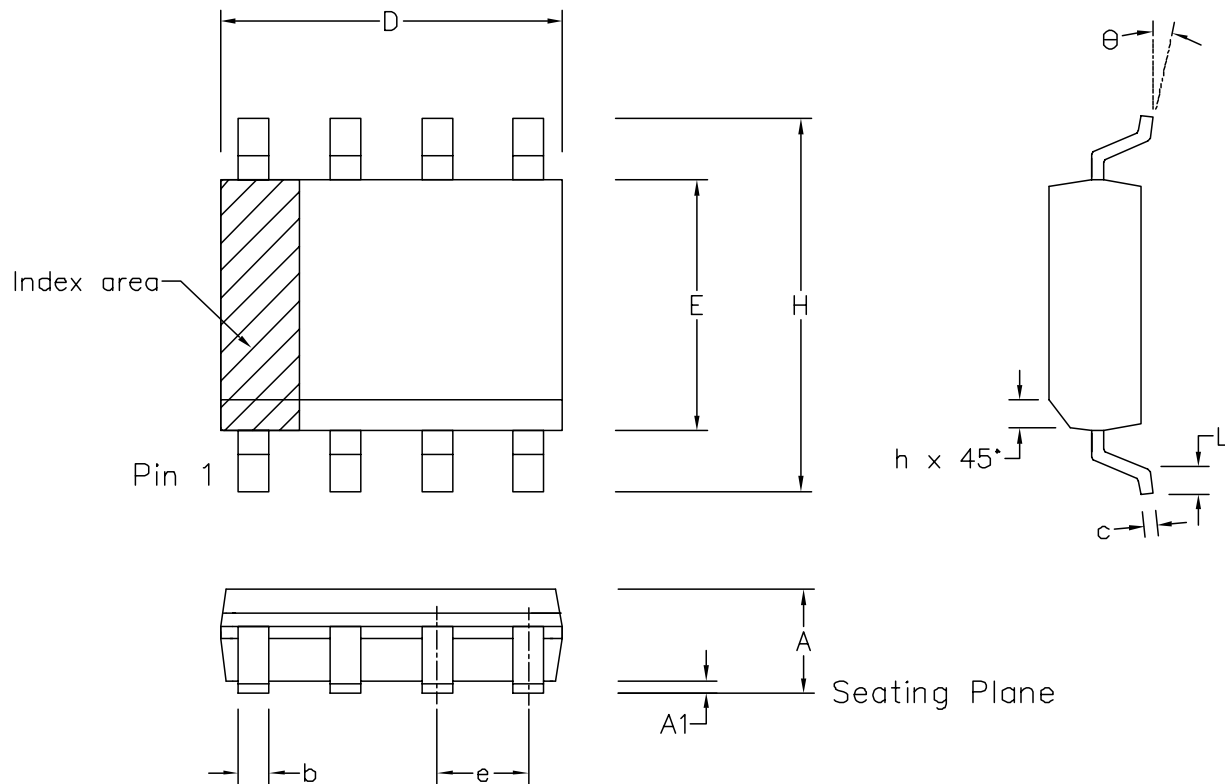


Fig. 9 Power-down time test circuit



| | Min mm | Max mm | Min inch | Max inch |
|-----------------------------------|--------------|-----------|-------------|-------------|
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| A1 | 0.10 | 0.25 | 0.004 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.197 |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| L | 0.40 | 1.27 | 0.016 | 0.050 |
| e | 1.27 BSC | | 0.050 BSC | |
| b | 0.33 | 0.51 | 0.013 | 0.020 |
| c | 0.19 | 0.25 | 0.008 | 0.010 |
| O | 0° | 8° | 0° | 8° |
| h | 0.25 | 0.50 | 0.010 | 0.020 |
| | Pin Features | | | |
| N | 8 | | 8 | |
| Conforms to JEDEC MS-012AA Iss. C | | | | |

- Notes:
1. The chamfer on the body is optional. If it not present, a visual index feature, e.g. a dot, must be located within the cross-hatched area.
 2. Controlling dimension are in inches.
 3. Dimension D do not include mould flash, protusion or gate burrs. These shall not exceed 0.006" per side.
 4. Dimension E1 do not include inter-lead flash or protusion. These shall not exceed 0.010" per side.
 5. Dimension b does not include dambar protusion/intrusion. Allowable dambar protusion shall be 0.004" total in excess of b dimension.

| | | | | | | | |
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